NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT
ORAL HISTORY TRANSCRIPT

ERNEST L. RANDALL
INTERVIEWED BY KEVIN M. RUSNAK
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RUSNAK: Today is August 22, 2001. This interview with Ernie Randall is being conducted in the offices of the Signal Corporation, in Houston, Texas, for the Johnson Space Center Oral History Project. The interviewer is Kevin Rusnak, assisted by Carol Butler and Jennifer Ross-Nazzal.

I'd like to thank you for taking out the time this afternoon to share your recollections of the space program with us. If we can start, actually, back at the beginning, tell us some about where you grew up and the kind of interests you had as a child and going into school, and maybe the path that led you into the space program.

RANDALL: I grew up in Oklahoma. My mother died when I was five years old, so I was raised by my grandparents—my sister and I. We grew up in little town, Ada, Oklahoma. It was a great little town to grow up in, very small, rural, and it was just a good place to grow up in.

I really first developed an interest in science, I guess when I was in the seventh, eighth grade, probably the eighth grade, I took a general physical science class, and didn't really know what field I was really oriented towards, but I just knew that we took some tests, and they'd indicated an interest—things like he liked to tear apart things and put them back together and things of that nature.

I liked to read. I had learned to read. In the summertime, I would go and live with an aunt in El Reno, Oklahoma, kind of give my grandmother and grandfather a vacation away from two kids. My aunt lived next door to the librarian in El Reno, and she got me hooked on reading. I became quite interested in reading. In the seventh and eighth grade, I got interested in William

Beebe, deep-sea explorer, with the bathysphere, [Auguste] Piccard. I got in to a guy by the name of, if I remember right, his name was Willy Ley, a German rocket scientist. So I developed an interest.

I did a lot of reading about submarines, submersibles. This was '40s time frame. There was a lot of submarine development going on and there was accidents and there were rescues and things, and I read some stories about development of submersible vehicles and things of that nature. So I had developed an interest underwater, really, as a young person. I made my first— took a compressor out of a refrigerator and made a diving bell that you could put on your head. It worked great until you bent over. If you ever bent over and lost the air, and the compressor couldn't keep up, so you'd have to be very careful not to bend over.

But later, after I graduated from college and was married and everything, why, as a sport I took up scuba-diving. We ordered our first diving units that came from U.S. Divers, and but at that time, U.S. Divers was in France. We were living in Wisconsin, and it was just very unusual. It was difficult to go out and go diving, because you drew a crowd pretty quick. So I dived until I actually came to Houston.

It is so difficult to find good diving without going out to what is known as the flora reefs, which is about 200 miles out. When I first moved to Houston, the only way you could get out there, somebody had access to a destroyer, an old mine layer, I think it was, or something. It was a very large ship. So it became a production.

One of my branch chiefs liked to scuba-dive, and he and I taught the first scuba-diving lessons that were held by the JSC Employees Association. We taught it in a pool up on Telephone Road. This guy's name was Dick [Richard L.] Holt. Dick flew, so we used to fly up to Possum Kingdom, which was an excellent clearwater place to fresh-water dive.

I've had the opportunity to live pretty much in each sector of the United States, and so I've dove off the coast of Washington and the Thousand Islands in the coast of Oregon. Cave-diving in Florida, scuba-diving in the Gulf. I taught a class at the University of North Dakota

[Grand Forks, North Dakota] when I was assigned in North Dakota, and we'd go chop a hole in the ice and go diving.

So I had an interest, and that's kind of where I started to develop an interest, oriented towards science. Like I say, I didn't have a particular area, but I just knew that I really liked science. I liked math. I didn't care that much for physics, but I liked math. I shouldn't say I liked it. I didn't have a problem with it, so that made it nice.

When I got into high school, they had it set up so that you had to take biology one year, chemistry one year, physics one year. I liked biology; that was okay. But when I hit chemistry, I really, really found a niche. Again, it just was something that was easy. When I got into college, if I needed a couple of hours, I'd just sign up for something in chemistry, because that was easy to do. But I was very fortunate in that the school system that I went to in grade school and high school, Ada had a pretty good school system and they had good teachers. So they encouraged, you know. We got the right encouragement.

I can remember, I think I was talking to Mr. Stewart [phonetic], who was a biology teacher, about, what are some things I need to take. He suggested I take typing. He said, "Typing is something that's really handy to have." So as a young man, I'm in a room that's predominantly—there's two things girls did: they took typing and they took Home Ec [economics]. Well, I didn't care for the Home Ec, but I thought the typing was reasonable and there was a couple other guys that took it, so there was a couple of us, sitting on the back row back there. That was a good piece of advice that I got.

I was also lucky. I played a little tennis when I was in high school, and when I got to college I got a scholarship. That was a big help, because my grandparents were not—we weren't poor, but we were probably a couple steps above it. They didn't have a lot of money. So from eighth grade on, I pretty well had a part-time job that I had to have.

So I was lucky going to college. I lived right across the street from the college. We had a little college in our home town. Back when Oklahoma became a state, the legislature created—

education was a big thing, so they created five colleges that were to be educational colleges. Their job was to produce teachers. And so they had Northeastern, Northwestern—I'm sorry, six—Northeastern, Northwestern, Southeastern, Southwestern, Central, and East Central. East Central was located in Ada, Oklahoma, so we were a little sleepy college town. I could live at home, so I was able to go to college. I have a B.S. in chemistry, a minor in physics, a minor in math.

When I graduated from college, I wanted to go to work at Redstone Arsenal [Huntsville, Alabama], which is now Marshall Space Flight Center [MSFC]. I really wanted to go. I could see myself mixing up rocket fuel and all of that good stuff. But the week that they came to the college to interview, I was sick, and so I missed it.

The next week, it was twelve o'clock and I was walking home. It was a Friday and I was walking home to have lunch, and I ran into a friend and he said, "Hey, did you interview for Western Electric?"

I said, "No, I didn't even know they were interviewing."

He said, "Yeah, you ought to interview. They're offering pretty good money."

So I went over to the dean's office. Treadwell [phonetic] was the dean's name, Dean Treadwell. He knew me from my freshman year. My first semester I made three As, two Bs, and a D, and he called me in and he said, "How can anybody have these grades and made a D in personal hygiene?" [Laughter]

We had a young lady teaching us, Anna Weaver Jones [phonetic], who, it is rumored, dated Stonewall Jackson, in competition with another young lady we had there that taught history, who was madly in love with Stonewall Jackson. You could develop a prejudice with her very easily, and I caught chewing gum the second day, which I learned was one of things she didn't like. She caught me with a toothpick in my mouth, which was something else she didn't like. She was a character, to put it bluntly, and as soon as I told him who my teacher was, he

said, "Okay. But it keeps you off the Dean's List, because you can't do that." So Dean Treadwell knew me for four years.

So when I went in to talk to him, he said, "The guy's gone." So he called the hotel there in town and the guy was just getting ready to leave. He was going to go back to the city and fly back to New York. He told the dean, no, he couldn't, because if he did, he'd miss his airplane and he'd have to spend a week in Oklahoma and he did not want to do that. So Treadwell told him, "Okay, but you're missing out."

Fortunately for me, the dean talked him into coming back out. He explained it to me. The program was at MIT [Massachusetts Institute of Technology, Cambridge, Massachusetts]. It was a special program that was set up for a particular defense project that at that time was classified. As a matter of fact, I think it was the number one defense project in the United States at that time, and it was called SAGE, Semi-Automatic Ground Environment. He said, "I want you for your math and your physics. You won't be doing any chemistry."

I said, "Well, I'm not interested."

When I said that, he was just—I mean, you could just see him, "God, I'm going to have to spend a weekend in Oklahoma for this." He was really—and he said, "Well, look, I'm here. Let me talk." Well, every time we talked—he started out at $365 a month. That was the salary. Every time we'd talk a few minutes and I'd say no, he'd go up ten dollars. So when he hit four and a quarter—I had just read in a magazine that the top wage a chemical engineer or a chemistry major could make that year. The top wage was four and a quarter, across the country.

Well, everybody that—I found out later—that Western Electric hired there, one guy got $375. Everybody else took the $365, because that was a tremendous amount of money. But the big hook, really and truly, the big hook for me was getting to go to MIT. That was a big deal. For engineers and things, that's really a mecca to aim toward.

It was a really good program. SAGE was a program—it was the first application for computers. What they did was they divided the United States into sectors, and you had a control

center, and then in this sector that this control center controlled, you put long-range search radars, and patterns are circles, so you wind up with gaps, so you put in what they call a gap-filler radar, and then you put in your height-finder radars.

What you wind up with is a 3-D picture of anything moving in the air across your sector. And, of course, we were oriented in those days to bomber threat from Russia. We were worried about them coming over the polar cap. This is pre-ballistic days, and the big threat was bombers. And so SAGE was designed—the entire United States was laid out into sectors. We lived in Newburgh sector, Newburgh, New York.

Then I went to Madison, Wisconsin, took a special assignment to go down to Kansas City to bring in a combat center there that was designed for training. The Air Force was bringing their crews in, training them in Kansas City, then sending them out to a sector. I went back to Wisconsin, we finished up that sector. We went to Portland, Oregon. Then we moved to Montgomery, Alabama; Grand Forks, North Dakota; Sioux City, Iowa. Then I went up to Maine on what they called a retrofit program, and that's where I left Western Electric and joined up with NASA.

But if you'd look at a sector and you look at how we made it up, and we had data links, we had the capability to have our friendlies—let me explain it to you. In a control center, you had two rooms. You had a surveillance room, and the job of the guy sitting in there was to watch the consoles. Anything that moves, you tag it, identify it, you figure out what it is. Is it something that's got a flight path filed, and things of that nature. If you can't identify it, it becomes a bogey. You then pass those off to the weapons room.

In the weapons room, you've got a combat commander. He has a weapons director. Each weapons director has six intercept directors. Each intercept director has six fighters, that he's controlling. So you're controlling some pretty good firepower there.

It was a great job because you got to go out to the sites and visit with the pilots and explain the programs and work with them, and explain the importance of doing this and doing

that. We were working with some really hot aircraft, and it was really a neat program. You had the capability for your fighters to squawk so you could identify them, so you've got telemetry data and you've got air-to-ground, and so you've got all of this little thing.

But I'm sitting there saying, "How am I ever going to go back to Ada, Oklahoma, and apply this to something?"

And then one day I get a chance to go to NASA. And what do they want me to do? They want me to do this worldwide. And so what I had done for six and a half years just really meshed nicely with when I came to NASA.

They had run the Mercury program. I came right after MA-9 [Mercury-Atlas 9] and they had run the Mercury program, but it was still pretty inspiring, you know, the thing that we had done. So when a new person came in, the guys expected a little oohing and ahhing, you know. And I said, "That's really great, but you're doing twenty-four-words-per-minute teletype, and we're used to high-speed telemetry, real-time type stuff." And so I wasn't super impressed, but I was very fortunate that I came out of an environment.

So as soon as I got down here, I started getting calls from friends in Western Electric that came out of the same environment that I did, and probably in the next year, nine or ten other guys came down. They'd spend the first night at my house, check in at the center, and then they'd start looking for a job. So it worked out for those of us that worked on this project, the SAGE project, it worked out very well for us to come down and fold into what we were doing at NASA. It was a fairly smooth transition. It was easy to understand the concept of what they were trying to do, because they were talking about the Mission Control Center. Well, I'd been working in a Mission Control Center for six and a half years, so I understood Mission Control Centers and weapons direction and things of that nature. So it was an easy transition in that sense.

RUSNAK: How did you find out that there was this opportunity at NASA? Was this something that you were looking around for a job, or they approached you?

RANDALL: Actually, we were living in Maine and we really liked New England. When we were in Sioux City, I had told my boss that I was going to quit, that I wasn't going to take another assignment. I was already enrolled at Oklahoma A&M. I had a scholarship lined up, to go back to school to get a master's degree.

My boss called me in, he said, "Now, look. I've got your assignment, but don't panic. We're going to get it changed." Because they knew all the guys in the South hated to go to the North, and vice versa. But my wife and I had really enjoyed living in Boston while we were going to school, and Newburgh, to a certain extent, was pretty nice, at that time. Maybe I shouldn't say that on TV. Maybe it's not too swift today, but anyway, it was a pretty nice place to live.

He said, "You're going Maine, but we're going to get it changed to Fort Lee, Virginia. We're going to send you South."

I said, "Well, I tell you what. I told you I was going to quit, but if you'll send me to Maine, I'll stay." Because we really enjoyed Maine, we really liked it.

We went up there, and we were there a couple of years. But I had just come off of a three-month assignment to bring in a new secret long-range, heavy-duty search radar. It was an over-the-horizon radar that was—you couldn't jam it. It had a random generator in there, a random-frequency generator, so every other time it burped, it changed frequency, so that there was no way you could—and it was random, so there was no way you could jam it. It took us three months to bring it in, so I was going home maybe every other weekend, something like that.

So I'd just come off of several months being away from home, and they wanted us to go north to—what's the island off of Canada up there? Nova Scotia. They wanted us to go up there,

but they weren't going to let us take our families, for six months. So that's when I started looking.

I may get in trouble for telling this, but I was very fortunate that at that period of time, 1961, 1962, engineers were in great demand. To give you an example, AVCO wanted me to come to Washington, D.C., and Jiminy Christmas, they were very nice people, but they just bugged you to death.

So we got a call one day and the guy said, "Look, we're going to send you tickets for you and your wife to fly down. We'll pay for a babysitter. Just the two of you come. Spend four days. We'll put you up in a room, you'll have a car waiting on you, and if it's convenient, if you could just come by for a couple of hours and visit. Just have a weekend on us." That was the kind of treatment you were getting.

So I flew to California, to San Francisco, to interview with Rocketdyne [Division of North American Aviation, inc.], because I still had in the back of my mind, you know, I'd never done any chemistry work, and I thought, "Oh, I'd like to go out there."

I had talked to Dennis [E.] Fielder in Houston, and they had expressed great interest in me coming. I had had several talks. Being an Okie out of Oklahoma, I'm sure they felt the same way, but Dennis was from England, via Canada, a long distance. The conversations were a bit difficult to understand, so I had to talk to him several times to be sure I really understood what was going on. Dennis is still a close friend today. I'll tell you stories about him, too.

So I had had these conversations, and they said, "Look, come down."

I said, "Well, send me a plane ticket."

"We don't do that."

I said, "We don't, either." [Laughter]

And so it was a real hangup. So I flew out to San Francisco on Thursday, had our interview Friday morning, and it was really a bad interview. They took us out to, literally, an

airplane hangar that was sectioned off. We called them cattle stalls. The noise was terrible, and how people worked in that environment, I couldn't understand.

In Western Electric, our work environment was pretty plush. I mean, we're working in brand-new buildings. For the first nine months, until we integrated the control center and the sector, we pretty much had the run of the building. The Air Force was there, we were training them, but they responded to us. So it was a pretty nice work environment. Nobody was standing over you.

If you're going to orient a radar site, you have to come in at sunrise, catch the sun right on the horizon, things of that nature. So if you've got to come in at six, you come in at six. If you don't have to come in at six, you come in at eight. And if you came in at six yesterday and worked till six last night, then maybe you didn't come in till noon today. So it was a fairly casual, pleasant operation to work under. It was pretty loose, in other words.

So went I hit Rocketdyne, it was very structured, and I wasn't sure I'd like that. So we're sitting in the office and the guy walks in and he said, "Look, you guys, we're going to ship you back East. If there's anyplace you need to stop on the way and visit relatives or anything, we'll spring for a stop."

I said, "I've got an aunt that lives in Houston." [Laughter]

He said, "Okay, I'll take care of the ticket."

So I rush out and I called Dennis and I said, "Dennis, I can be there in the morning, ten o'clock."

Dennis said, "We don't work in the morning."

I said, "Well, that's when I can be there. I'm scheduled to fly in there Friday night. I can meet with you at ten o'clock, and I'm flying out of there Saturday afternoon."

So Dennis brought a group in at ten o'clock on a Saturday morning. Jim [James L.] Strickland. I forget who all was there. I interviewed. That's how I got my interview with NASA. They offered me a GS-11. At the same time, I was offered a GS-13 out at Edwards [Air

Force Base, California], which was pretty tempting, unless you've been to Edwards. [Laughter] Houston wasn't the greatest place to live, but it sure—I just could not get excited about the East Coast or the West Coast. It was just not the place. My sons were approaching the age where they were going to be going to school, and I wanted to settle down. We'd been on the road for six and a half years. I was a field engineer.

One of the perks of the job that we had with Western Electric is that we were given $60 a week expense money, nontaxable, to cover the cost of the fact that we were mobile. In 1957, four and a quarter [$425] plus 240 is not a bad salary.

I went down to visit with my science teacher, who was working on Saturdays at a local drygoods store, to tell him about my job. The school superintendent for a little town called Bing, just outside of Ada, happened to be in, talking to him. When I told him I had hired on at four and a quarter a month, this guy told me, he said, "Shoot, I can give you a job at Bing at 1,200 a year." So you do the math. Four and a quarter was pretty good, and then 240 on top of that. So Western Electric was pretty tempting to get me started.

But when I made the decision to leave, I had family in Oklahoma, my wife had family in Oklahoma, and our kids had grown up away from our families. So the East Coast and the West Coast wasn't all that great. I thought that GS-11 in Houston, with the cost of living, and the area, and the availability to Oklahoma was better than a GS-13 in California.

Later on I turned down a 15 to go to NASA Headquarters, for the same reason. Also had a chance to go to Hawaii as the assistant station director at one point. I turned that down, because when I checked into the educational system out there, at that time—I don't know how it is today—I'm sure it's better, but at that time, whites were a minority and a lot of folks sent their children back to the States to be educated once they reached the seventh grade.

And like I said, I was looking for some roots. I wanted a place. When we moved to Houston in 1962, we bought a home at 306 Crystal [Street, League City, Texas], and that's where we live today. So we pretty well settled down.

So that's how I got to Houston. I took a look at all of that and I said, "Okay, we'll come to Houston," and we've been very happy ever since.

RUSNAK: That's good to hear. So when you show up for work your first day, what was your impression of the Manned Spacecraft Center as it existed at that point, and the sort of environment in which everything was operating, the status of the work you were going to be doing, all those sorts of things?

RANDALL: When I showed up for work at Houston, it was pretty chaotic. Personnel—you go down Telephone Road and you turn right and you go back and you get off down on Navigation, someplace down there. Today you'd probably have to fight your way in or fight your out of the area. But Personnel was in a little old building down there, and I believe there was a grocery store on the first floor, and you walked up this flight of stair and here's Personnel.

We were in the Stahl-Meyers Building, which today is an Oshman's [sporting goods] warehouse. The office complex next door was the Houston Petroleum Center, and I think the oil derrick is still there today. The Houston Petroleum Center facilities were pretty nice. Stahl-Meyers was not very nice. The air-conditioner worked about two days out of the week, and we were upstairs, and it was pretty packed. We were jammed in. I think in our office, which was about the size of this room, I think there were six of us in this office, so it was pretty tight. But everybody knew, you signed on, you know, that it's—we knew this was temporary and we knew that it was going to get better. So you really didn't look at it in that light.

I went to work on a Monday and the next Friday—no, I went to work—I take it back. I'm not sure what day it was I went to work, but I was told the next Sunday I would be flying to California for a conference. I wish I could remember the guy's name that was the personnel director for Flight Control Division. He was a super nice guy, a gray-haired fellow. I can't

remember his name right now, but he and I had many philosophical discussions, because there were things I wanted to do and the government didn't do it like Western Electric.

If you were going to travel for Western Electric, you traveled between eight and five. If you were caught on the road at 5:01, you're in deep stuff. You traveled on company time. And so my first comment was, "What is this Sunday night jazz?"

Well, I learned that at NASA, you travel on Sunday night out and you come home on Saturday night or Friday night, coming in, I learned.

I also learned that if you're going to go to school, you can't go to school to acquire knowledge. You have to have a job that requires that knowledge already. I wanted to get my master's and I wanted to get it in computer science. This gentleman, we had a long talk, so I said, "You wouldn't have hired me without a B.S. You require a B.S., but yet you won't—"

Western Electric, if you want to take basket-weaving, they would sign you right up. They figured if you were learning something, somewhere down the line it was going to help. So Western Electric had a very liberal education policy, and the government's just the opposite. Unless you can show that your job demands knowledge of something, they wouldn't spring for you going to school.

So I was going to go on my own, but I laid out a program and went out there and the guy that was head of the science department at U of H [University of Houston] said, "Okay, but you've got to take thirty-two additional hours."

I said, "But the whole program's only thirty-two hours."

He said, "Well, that's the written. That's what's published." But he said, "I'm head of this department and I have a program and you have to satisfy my program."

I said, "I don't have that much time." So I never did get a master's degree.

But I left on Sunday night, went out with a couple of guys that were—I won't tell you his name. I went out with a guy that was in my group, my management, and we went to this conference, and this guy gets up on the board and he starts laying out theoretical, mathematical

equations that has something to do with the way Saturn would affect water on the Moon type thing, really, really way out, theoretical, off the wall. And they are writing this thing, and I sit there for two days and I don't have a clue what they're talking about. And I'm thinking, "I have really made a mistake." [Laughter]

So I went to my associate that I was traveling with, and I said, "I've got a problem. I have really misled you folks, because I don't know what they're talking about. I do not have that kind of background and I can't help you."

He said, "Well, I don't either."

I said, "Why did we go?"

He said, "You know, I really don't know. They told us they want to send so many people to these conference and they picked some people out of here and some people out of there, and they picked you, too."

So my first week, I was pretty scared at the end of it, because I thought I had jumped way off over my head. But we got back, and once I began to understand my role, it was a lot more comfortable. But you asked me what my first week was like. It was not pleasant. [Laughter]

RUSNAK: It certainly sounds like it was a unique first week.

RANDALL: It was. It definitely was.

RUSNAK: When did you actually begin finding out the real duties you were going to be learning? How were you trained, or did you find out about everything you were working on?

RANDALL: Really, I wasn't trained. I've had some excellent education through NASA. Over the years I had the opportunity to attend some really, really outstanding courses and things. But I didn't do anything—the first year was really just, you kind of got in there and got your hands

dirty and you just kind of wallowed around in the mud and made yourself a hole, really. We'd just kind of talk about things, like we started talking about the Gemini program, how are we going to organize the network, because the network was going to expand. What are the capabilities to communicate? Things of that nature. How are we going to tie this in to the control center? And that's where this first document that Harold and I worked on, this network data flow thing. So we kind of eased into it that way.

The first time I walked into the Mission Control Center, you could look up and see clouds. It was just steel girders and they'd just started doing some things on the first floor. The first floor was beginning to come together, and they had laid the girders for the second floor stuff. I had been working for NASA about eight or ten months at that time.

I lived right across the lake. We drove to Houston every day. I made the decision—a lot of people lived in Houston. I didn't want to move, so I told my wife—I drew a circle with a center point, the site. I drew a ten-mile circle, and I said, "We'll live inside this circle," because I didn't want to drive. I had friends that worked in New York City. They got transferred from Western Electric down to New York City. They commuted four and a half hours one way each day. They would leave four o'clock in the morning, get home eight o'clock at night. They didn't see their children all week because the kids were still in bed when they left, and when they came home, they'd gone to bed. So they only saw their children on the weekend. And I knew that was not for me.

So we went ahead. We thought we had seven days to find a house. We found our house in three days, and I called the moving company the morning of the fourth, to tell them that when our furniture came in, don't unload it, because we'd been told that's how it gets damaged. They said, "Well, it's funny you ask, because they backed up to the loading dock. We're just getting ready to start unloading."

I said, "He's not even due for three more days."

"Well, he's here." So they came right out that day and unloaded. But I wanted to live close.

As far as the first year, really and truly, I just can remember a lot of blue sky. You sit in a room, and "How are we going to do this?" And "This is the way we did it in Mercury, but they told us if we ever did it that way again, they'd kill us." So you just kind of felt your way through it and worked the process out.

Dennis Fielder was just outstanding. To get into Dennis' office, a lot of times you had to almost get down on your knees and crawl in, because he would take butcher paper and go around the room, and he'd tape it up, and he'd start, and he'd just start writing, and he'd just write and write and write and write and write. He'd just sit there and he'd lay it all out. The guy was just great, but particularly at saying, okay—I mean, he was already thinking Apollo. We were still trying to figure out how we were going to do Gemini, but Dennis already had one eye out on Apollo and he'd just write these things out.

He was a very interesting person to work for. I went into his office one day. Stahl-Meyers was hot three days a week, at least. And I come in one day and Dennis is sitting there with a suede vest on, and I'm just wringing wet, and he'd just cool as a cucumber. I said, "Dennis, how do you do it?"

And he said, "Well, Randall, it's a matter of controlling one's own thermostat." That was his answer, and I couldn't begin to imitate his English accent. But Dennis was cool. And everybody in town knew him. He was a bachelor. Everybody liked him. He had his little beard, before beards were popular. He was just a super neat guy, and everybody in town knew Dennis. He was a real nice guy. But he really knew how to get out in the future. He was very good at that.

RUSNAK: At this point, what exactly were the responsibilities that you had? You're talking about developing these things for Gemini, but maybe you can explain a little—

RANDALL: We were, and I don't remember the title, but we were in—Dennis Fielder had the branch. I was in a section that was headed by Jim Strickland. Jim had a very large section. Jim probably had twenty people in his section, which, you know, an ideal section is seven. So he had a large section. Dennis' branch was a part of Flight Control Division. John [D.] Hodge was the Flight Control Division chief.

Chris [Christopher C. Kraft, Jr.] had just stepped up a notch to the—I don't know whether he was the assistant director—he might have been the director, but you had Mission Planning and Analysis Division [MPAD], which is the people that were really the ones that belonged out at that seminar. I mean, those guys ate that stuff up and they were good at it.

They had Recovery Division, MPAD, and Flight Control Division, is the way I remember, plus a little office that this guy—I can't remember his name right now—handled the personnel stuff. Our division was Flight Control, and at that point Flight Control was everything. You had Recovery, you had Mission Planning and Analysis, you had the flight controllers themselves, the people that manned the Mission Control Center at the Cape [Canaveral, Florida] for the Mercury program, and we were down there for the Gemini program for three flights. So really, there weren't as well-defined lines then as there were when we moved out to the center.

When we moved out to the center, the first thing they did was split Flight Control Division into four divisions: Flight Control Division, Flight Support Division, which I went into, which was responsible for the Mission Control Center, the mission operations computers, and the network and things of that nature. You still had the MPAD. There was a separate division then. And Recovery, which became a division. So once we were kind of like all compressed, like a zipped file. We were all compressed, so there wasn't a lot of maneuvering room. You kind of knew what you were working on in your area, but as soon as we got out to the center, we kind of popped out, and then we really—you know, you focused in on your thing more.

I worked, in general, in the area that would concern data flow, integration of the control center and the network, identifying capabilities, because there's things you could do from MILA [Merritt Island Launch Area, Florida] that you couldn't do from Tananarive or something like that. Or [Guaymas] Mexico was always a pretty limited station. None of the flight controllers liked to go to Mexico because they didn't have command capability. They liked that being in control thing. All you could was just talk. You just identified those capabilities and things, and that's what we pretty much worked on.

A lot of times, it takes about six months to learn the language. When we hired somebody, we just figured six months. You've got to give them that much time to start picking up the language.

RUSNAK: Maybe then you can run us through some of the history of developing the system for Gemini, how these things were integrated from this early point, where you're trying to develop what are the requirements, what are these things that we need, until it was actually operational, when you hit these first missions, where you've got real hardware that you're testing out to make sure it works during a flight.

RANDALL: The first thing I can remember, of course, was going down to the Cape, when we started getting ready for the program. The control center had been pretty well defined. They had a pretty good handle on what they wanted in Mission Control Center for the Gemini program, and it was pretty much what they had in Mercury. Some capabilities had changed, but it was fairly similar in layout. It was the same building, same consoles and things. The network console, which was responsible for the control center and the network, the network console had been staffed by Pete [Henry E.] Clements in the Mercury program.

If you look at the history of the Mercury program, Bermuda was very important, because that's where they got their "go/no go" for orbital insertion, and that's where you knew you either

had or didn't have Apollo. So Bermuda was very important. And they had a lot of problems on Bermuda hardware-wise and things like that.

So the Gemini program, the network was pretty important because the potential for delays that had manifested itself in the Mercury program were still there, as far as they knew. There was two Air Force guys that were manning that console.

So I remember going down there, and there was a half a dozen of us. When they had reorganized Flight Support Division, Dennis Fielder had moved up to a planning-type operation, and a guy named Dick Holt took over the ops branch. We were in the network—I think they called it Network Integration Section or something like that. We had these two Air Force guys that had probably—I don't know what their history was, whether they had worked with Pete in the Gemini program or something, I really don't remember. I just remember we were supposed to be learning that console.

Like I say, there was a half a dozen of us, and we were sitting in the viewing room, and all you can hear is the flight director. We all had headsets, but nothing to punch them into. So I sat there for a while. We were running launch sims, so I just got up and walked out of the viewing room and walked down and introduced myself to the two guys and asked them if they mind if I plugged in behind them. Well, everybody was sure—you know, we were all new, you don't know what you can do, what you're going to get in trouble for doing, so you're really walking on egg shells.

Kraft, it was kind of like being in the presence of the Pope or maybe even a little higher. We all knew Kraft and Hodge, so you walked lightly around them. Nobody would go down there, because they thought they'd get chewed out or something. But it was obvious we weren't going to learn anything, so I just went down. So I sat through two launch sims, and Dick Holt come down and said, "Okay, let somebody else come down now."

"Hey, I was the one to come down."

He said, "Yeah, okay, but let somebody else."

So that's how we got on the console. Then we started riding the console, and we'd just sit through the sims and learned a lot. The network position was a great position to learn a lot of things, because a lot went around because you were right next to the flight director. So there's a lot of things going on that—it's not that you're eavesdropping, but you're sitting there.

I remember one of the first things. I really remember it because of what happened later. We had had in, I think it was the early Mercury program, but they had had a launch blow up in a cloud. Didn't have good visibility. So they had rules about coverage and things. Kraft was worried about meeting the launch date because of the weather, and Walt [Walter C.] Williams said something that I never forget. He said, "Chris, a year from now, nobody in this country will be able to tell you the date we launched, but they will be able to tell you whether it was a success or a failure." I thought that was pretty good. That really came back later when we lost a craft.

So you've got to learn a lot of things in addition to what your job is. I was very fortunate. Or anybody that sat on the console was very fortunate to be where we were sitting in the room. It was one thing to be down in the Trench. There was a lot going on down there. But I had a four-star general behind me which ran the recovery forces, that you can't help but become friends with. Of course, people from Headquarters and PAO [Public Affairs Office] are behind us. And of course, anytime PAO needed anything in the building, they'd come to us, so we were good friends with the guys on the PAO. So it was just the opportunities to interface with people and do things. It was pretty neat to be in that position.

So we rode that position, and then when we got to GT-4 [Gemini-Titan IV] —GT-3, they sent a crew back to Houston, and we piggy-backed GT-3. I came back for that flight. I ran the control center for GT-3, in the backup mode. We monitored the whole mission from backup, because they wanted to demonstrate the readiness of the control center. Then when GT-4 came around—I don't know if "prime" is the right word, but I think that's the word we used. The early missions were one-day missions, so Chris was red flight. So you wanted to be on the red team, or the launch team, because that's where all the action was.

After we got into twenty-four-hour-a-day stuff, then you had a term called "on the network" and "off the network." "On the network" means that during the orbital pass they're going to be in contact with the majority of your ground stations, and so you've got periods where you've got a whole bunch of contacts, and then you've got periods where you have to send a ship out there, and you can go a whole pass and that ship is your only contact, because you had a mission rule, you had to talk to them once a rev. And so a lot of times, that's why Guaymas was so important, even though people didn't like to go down there, because they didn't have command. But Guaymas was important because that was an off-the-network site, so you'd put a ship out in the northern Pacific and you'd touch them up there, and then they'd come down across Mexico, and Guaymas would pick them up. Then you wouldn't pick them up again until they got up to the Pacific again. So you wanted to be on the team that was on the network, which was almost always red team with Chris. So it was neat to be on the red team, or what we called the prime team.

GT-4, five, six, seventy-six, eight, and ten, Apollo 1, then I had an unmanned LM [lunar module] mission with Gene [Eugene F.] Kranz. Apollo 7, 8, 9, I skipped 10. I was not prime on 11 because I wanted EVA [extravehicular activity], and I was prime on 12. Those were the missions that I—

RUSNAK: Even the ones that you weren't prime for, did you still work on?

RANDALL: Yes. Like I say, on Apollo 11, I wanted the EVA. Apollo 11 was divided into phases, and you couldn't say, "Okay, I want launch and I want EVA and I want reentry," because that would be the really neat ones. But you'd be asleep during maybe one or two of those. So you divide up the phases, and when you picked a phase you wanted to work—we had an Air Force captain named [John A.] Monkvic, and he was really hot to be on the launch team. I said, "That's great, because I want to be there when they step out on the Moon." That was my goal.

Now, GT-9, did I say I worked that one? I was in Hawaii for GT-9 and I was in Hawaii for Apollo 10. I had gone out on the network to brief the Western Network, we called it. Hawaii, Guam. We had some tracking ships in Sydney [Australia]. We had near-Earth and deep-space stations in Australia, and I made a tour out through there and briefed on Apollo 10, what we were going to do on all of that, and I wound up in Hawaii for the Apollo 10 mission, so I didn't work GT-9 and Apollo 10. I was out at a site.

But I switched over. I did not work GT-11 and 12, because I switched over to Apollo 1. We had moved up—you know, we were flying GT on one floor and we were getting the other floor ready for Apollo, so I had moved up and started the work, the integration work and stuff like that, the documentation you've got to do and everything, to get ready for Apollo. So I did not work the last two Gemini programs, 11 and 12—10, 11, 12.

RUSNAK: In your previous career with Western Electric, had you done anything like real-time flight control, anything that prepared you for that?

RANDALL: In a sense. In a sense, you do, because you start out, first of all, in the testing hierarchy, you start at air surveillance. If you demonstrate certain capabilities, then you work your way up into the weapons. That's kind of where everybody wants to be because you get to pull the trigger. So in a sense, when you're directing a team or a flight of six intercepts, you've got your bogey, you tell him what he's doing. In a sense, you have some flight control thing. It's certainly nothing like the space program, but you're watching.

Maybe you'll have—let's see if I can remember right. One day we had, in North Dakota, we had a general bringing a bunch of Catholic nuns through, and one of the intercept directors sang out that he had "Tail numbers 206, 206 was aborting, due to a SIF problem at Twenty Angels," or something like that. And of course, there's all of these nuns sitting there and you're talking about aborting and SIF and everything. And what had happened was that you had

scrambled, and one of your interceptors had developed a Selective Identification Feature problem, which is how we told the good guys from the bad guys. So he had a SIF problem, and he was an angel aborting, due to a SIF problem. So that got the general into trouble. But you had that type of thing. You're monitoring in a cinch. You don't have full telemetry so that you can monitor the health of the aircraft, but you have the capability to monitor some things, and you know where he is, what his heading is, whether he should be going up or down, turning left or right, and that sort of thing. So there was a very generic level of flight control involved in that.

A lot of times, later in the program, at North Dakota, I was the Bomarc test director. We were responsible for integrating the Bomarc missile into the Grand Forks sector. I had done some Bomarc testing in Montgomery, Alabama, before I transferred to Grand Forks, and had worked back in the control center, monitoring some of the launches down there. We got in big trouble one time when we hit our target, there's supposed to be a mathematical offset because the drones cost several million dollars, so you don't want to nail the son of a gun. And we did. We blew him right out of there, and it cost the Air Force $2 million. And so somebody caught heck because we were too good on hitting our target. I just remember that, for whatever it's worth.

RUSNAK: Out of curiosity, did you ever talk with Dennis Fielder about your work on the Bomarc?

RANDALL: I really don't remember it coming up.

RUSNAK: Because you had mentioned that he came to NASA via Canada, and one of the arguments for canceling the AVRO Arrow program that they were working on was using the Bomarc missile.

RANDALL: That's true, that's true, very true.

RUSNAK: I just wonder if there was any kind of a—

RANDALL: I don't recall that conversation, I really don't. But that's true, I do remember that happening. I guess the thing I remember the most about the Bomarc missile is going out there and standing next to that son of a gun on the launch rail, and they got a little tiny pin, about like a pencil, laying over on the table, and if the thing accidentally fired, that little pin would hold it. That's when I learned about high shear strength on some metals, because that little bitty baby would sit there and hold that missile. I thought that was pretty impressive. [Laughter]

I know you can go the opposite way and you can have shear pins on Bushhogs, and they're designed to shear, so that you don't damage your transmission. But, boy, the shearpin on that Bomarc, it was something. I couldn't believe it would hold it down, but they assured me it would. Because we had run right up to the stop. We had some tests that were cleared. You had to go clear to Washington to get cleared to do the thing, because you run right up to where you push the button and that means you pull that pin, because that's part of the procedure is to pull the safety pin at a certain point. So once you pull that thing, you've really exposed yourself. We ran one test like that and, boy, there were a lot of sweaty palms while that was going on.

RUSNAK: I bet there were. I'm kind of struck by the fact that here you are coming into flight control and you've had both experience in the field, having worked on network sort of things, and you've had some of this flight control experience, through these types of control centers, yet it seems that most of the other flight controllers coming into the Mission Control Center were like fresh out of college and never had any of this sort of experience. So I was wondering how you fit in with the rest of the flight controllers.

RANDALL: I really don't remember. I don't remember anybody sitting around, saying, "This is what I've done. Y'all ought to move over because I know this and I've done that." I don't really remember any of that. I would say that we were more focused on what was coming up that what somebody had done in the past.

I think it would be safe to say at that point in time that there was a lot of testosterone in the room. Everybody thought they were the 200-pound gorilla. And I'm not sure, frankly, that that wasn't encouraged a little bit. I know that in mission rules review sometimes it got pretty heated, and I think what that did was force you to make dadgum sure that when you took a position, you were really comfortable with that position, that you really believed in that position, and you were ready to go to mat for that position. Because you knew you were going to get attacked by somebody just for the fun of it, if nothing else.

I mean, the astronauts loved to chew on the aeromeds [aerospace medicine doctors/flight controllers]. I think we were getting ready for one of the Gemini missions, and the aeromeds had a mission rule that if they lost a certain parameter that indicated whether somebody had ejected or not, they wanted to abort the launch. Now, sitting on the pad in a Gemini spacecraft was not a pleasant thing. I don't know if this is true or not, but I was told that in developing that ejection system, they shot a guy out of a bomber, straight down. The first three or four guys they shot out, it broke their legs, so you've got to admire the guy that went fifth, knowing that, you know. So we knew that coming out of those—just sitting around on that pad is not something you want to do any longer than you have to. It was either [Walter M. "Wally"] Schirra [Jr.] or it was probably more like Pete [Charles] Conrad [Jr.], because this is something he would say. They said, "How are we going to know? How are we going to know if he aborted or not?"

And Conrad said, "Hell, that's easy. You just listen, and if you hear a real fast little [demonstrates], they didn't abort." That was his answer to the solution. And the aeromeds lost their mission rule. Everybody laughed and they went on. But there was a lot—like I say, I think it was good. I think you really came up with a very pure product because you knew the

distillation process was going to be very strenuous, and I think that was good. I think that gave us a good quality, like in our mission rules and things of that nature, I think that gave us a good quality to the product.

RUSNAK: Maybe you can describe for us, as you're sitting on a console in the Gemini program, what sort of things are you looking at in front of you? What kind of event lights do you have on your screen? What are the types of things that you're monitoring, actually, during a flight?

RANDALL: During the Gemini program, you've always got one eye on MILA, MILA being the tracking station, because MILA was mandatory for launch, and I can tell you something about that when we turn the camera off. [Laughter]

In pre-launch phase, you've always got MILA in the back of your mind, how's that doing. You're always watching that. You've got to be looking ahead, too. You want to be sure that Bermuda, everything's fine out there, because that's real important. But really, from the network console, you're not monitoring—I'm not sitting there looking at the status of a tube and the klystron and the radar or something like that. I'm not monitoring at that level, but really, you're talking to the M&Os [Maintenance and Operations] at the sites, are they comfortable and things like that. You're talking to your people, to the people down in the real-time computing complex, the computer supe [supervisor], making sure that everything's going good down there. And your display people, your air-to-ground people.

The network controller has, or had, when I was on the console, a staff support room. This staff support room was manned by personnel from the Goddard Space Flight Center [GSFC, Greenbelt, Maryland], predominantly contract personnel, but they were Goddard folks. The way it worked was, Goddard had the responsibility for building the network. They started with getting the ground and then acquiring the equipment, building the facilities, getting the personnel, staffing it, training it, integrating it, so that it's all up and ready to go. So they had

people that were highly expert in their systems, so if I had really wanted to get down to the nuts and bolts on a particular system, I could get on the loop and call my command guy and talk to him, or my radar guy, or whatever the situation was. And of course, you're attuned to what's going on.

There's always silly things. GT-4, we fired the thing and somebody sent forty pounds of nickels in the P- [pneumatic] tubes or something. The next thing I know, they've got these wires out there on Chris' console, running wires and stuff, and he's trying to fly the mission. I remember one time a guy was running up and down there, and Chris jumped on him and told him to get out of the room. He didn't care if the P tube didn't work. And then about ten seconds later, Chris realized. So he calls the guy and the guy comes back in the room, and he is really scared. And Chris said, "I am sorry. You're just doing your job."

And that's the type of person that you've got to work with in the control center, and those were people that—like I say, in the mission rules reviews, you'd go head-to-head with somebody, just toe-to-toe. I mean, it was no give. Then you'd go out and drink a beer, it's all over. I don't really know of anybody that ever carried a grudge out of a—I really don't. That was a really pleasant environment. We knew that we had a job to do, a very tight schedule, and if somebody did something and it took us four months to figure out it was a human problem, then we lost four months.

So you had to be able to stand up and say, "Hey, I screwed up." But you could do that knowing that you were going to get whipped royally, but then they'd be right there five minutes later, just like it never happened. And you knew that you could do that. Now, obviously, if you did it too many times, they're going to move you out. But everybody's going to make a mistake. So you could do that. You could stand up and say, "Hey, guys, I'm sorry. I made a mistake." You could do that and know that you weren't going to be crucified for it, and that really gave you a good environment to work in.

You could go in the control center, run a sim [simulation], make a mistake. When the sim supe come around, you could say, "Hey, you're right, I screwed up," and you knew that nobody was sitting there saying, "Going to remember that." So that was a very pleasant environment to work in, and that was the type of people you had. If somebody did something wrong, they'd stand right up and say, "I messed up." From Kraft on down. I thought that was pretty good.

RUSNAK: Is that something you had to learn, to work inside that environment, or you were there and that's how it was?

RANDALL: Well, I think you acquired, and it's like being on a team, and you become comfortable with people and you want to do good for your team. So I think it's something that builds on you. You begin to realize the commitment. I mean, I don't even know where I was when the president made his speech. I remember seeing it on television. I think I was in North Dakota.

I do remember one time in North Dakota, we had some pretty sophisticated radars, and so they came in one day and said, "Okay, from this time period to this time period, all radars will point to the north." That was unheard of. You do that, you reduce power. We'd never heard of that. Then we found out Mercury spacecraft. In the early days of Mercury, they weren't sure what the radar energy would do to the explosive bolts, so they didn't want some radar pinging energy off of the spacecraft. So there were times when the air defense system shut its eyes, so to speak, so that they didn't mess up the Mercury spacecraft.

RUSNAK: I bet they didn't share that with the Soviets, though.

RANDALL: Very secret, very secret. Going to work on the number one defense project makes it difficult for your home life, in a sense. So my wife learned early on that I couldn't come home, and, "Honey, what was your day like?" because you couldn't talk about it. So I think that helped my marriage and things, because my wife was used to me having to go in at six o'clock in the morning. I didn't have an eight-to-five-type job.

Sometimes when we were doing data reduction—we'd do data reduction-type work—when we were working in Western Electric, you did all kinds of jobs. We had these big computers and you did all kinds of stuff, and when we went to school, we learned programming, we learned how to operate the computers, we learned radar. We learned all of those things. Air-to-ground. Now they call it computer science. Then they called it digital techniques, was the way MIT, I think, put it. It was called digital techniques. So it was not unusual for me to go to work at four o'clock in the morning, come home at noon for the end of the day.

So when I went to work at NASA, I don't think it put a strain on my marriage, because I hadn't had an eight-to-five job previously. You talk about your interface at work, which is pretty important, but your interface at home is important, too. I think my work at Western Electric helped me then at NASA, in my home life, because my wife was used to me working crazy hours, long hours, things like that.

I think coming in to NASA, it was just an acquired thing. You begin to understand and appreciate, you begin to sense the goals. Let's face it, landing a man on the Moon is the last decent goal NASA has had. We had a goal. You were working towards that goal. Guys worked themselves to death for that goal. A lot of guys died after we accomplished that goal because they couldn't handle forty hours a week eight-to-five. After we finished the Apollo program, it was a real shutdown, layoffs and things like that. It's the first time I can remember where they actually fired people, things like that, fired government employees, cut back on contractors.

It was really different, and some guys couldn't handle that. I know a lot of guys took on extra jobs or things. I went into business. Somewhere around '71, something like that, I was

sent to a management school. We went over to Bandera [Texas]. They locked us up for fifteen days. There was a bunch of us that liked to shoot skeet. They gave you fifteen or twenty tasks, and you could pick twelve of them, and one of them was, go into business. And you laid out, how do you go into business? What are all the things you do to go into business?

They had just shut down our shooting range that we shot at in Pasadena [Texas]. So when I came back, a guy that I knew in the class that was from Houston said, "Man, they just shut my range down. You ought to do that. That's a good idea."

And I said, "Well, I shot up there, too. That's where I came up with the idea." So after everything died down, why, my boss and I were big shooters, so we started looking at it as a joint thing. It took me six years, but I finally put together a package and I opened Clear Creek Hunting Range, '76. But a lot of guys, you know, guys were selling Amway and they just couldn't handle an eight-to-five job.

RUSNAK: We've talked to a whole range of people that once Apollo was winding down, they were like, "What's next? What do you do after putting a man on the Moon and having spent all this time there?" And then other people seemed to be able to grasp some different challenge and approach it in maybe a little bit different way, but sort of with the same enthusiasm. So I think we've had a whole spectrum of people here telling us about these experiences. But I can see how that after spending eighty hours a week and doing something as inspiring as getting men to the Moon, it might be difficult to match that later on. But it sounds like you had a solid grasp on where you were going and what you were doing so that you could get through that period.

RANDALL: I enjoyed it. It was a different challenge, but I enjoyed it. I could never imagine working anywhere else than here at the center. Like I say, I had chances to go to Washington and I had chances to go to Hawaii. I had a lot of contractors. I had gentleman that was with

IBM told me, he said, "As long as I've got a job at IBM, you've got a job if you want it." And I thought that was a pretty nice thing for a guy to say.

I don't know the time period. I know I was a GS-12, which caused some problems because I was kind of a pseudo section head. We had a section, but it was very big, and I had some guys that were working for me, and one guy was a 13, so that didn't sit well. But when they decided to formalize the sections and make it a section, they came out with a rule that if you sat on the console, you couldn't be a section head. Now, that rule wasn't a center rule; that was a decision of management within our division.

So I told them, "Okay, I don't want to be the section head."

Pete Clements called me down. He said, "Randall, that is the dumbest thing I ever heard of in my life. Why would you turn down a promotion?"

I said, "I cannot imagine lifting off and not be in the control center. I just think I could do that." And that's the way a lot of people felt. Boy, that was the place to be and that's where we wanted to be. A lot of guys made a lot of sacrifices to be there. So there was a lot of commitment to the program. I think it's one of the reasons it is the success that it was. People were willing to make a personal commitment, and I think that was good.

RUSNAK: That may be a good place to pause for a minute so we can change out our tape.

Okay, we're back, if you want to continue on what you were just mentioning.

RANDALL: After we flew the Apollo-Soyuz [Test Project, ASTP] mission, somewhere in that time frame, I had been made a GS-14 a year or two earlier, even though I didn't have a section, so it was a little unusual, but I took over a section called the real-time computer complex [RTCC]. I think there was nine people in the section, that manned the ops [operations] console in the real-time computer complex. We were responsible for all the computers on the first floor, not just the mission operations computer, but all the computers.

I had two contracts. I had a ninety-man IBM contract that was responsible for maintenance on the computers, and then I had about 340 people with SDC. They provided the computer operators, the people who physically ran the computers, hung the tapes, and managed the tape files and things like that. This was an operations function, but it was pretty different from what I'd had in the past. This was probably the first time that I had had to really work directly with contractors, and it was a bit of a problem because putting IBM and SDC in the same room was kind of like dropping sodium in water. I mean, you'd just stand back for the explosion. They just didn't like each other. They didn't want to work together. Each wanted the other one out of there. It was just really not a good situation.

It took me probably two months, but the very first meeting I told them, I said, "Now, the first guy that says he has a problem, I'm going to hit right square in the nose. That's just the way it's going to be. The only people who've got a problem in this room is us."

And I had run into this one other time. I had run into it when I was on the network console. MILA was high-speed data, and we were having a problem getting the data, and the people responsible for the communications, that were sitting on the west side of the Banana River, said, "Everything's great." MILA, on the east side, said, "Everything's great."

So I told them, I said, "Look, I want you two SOBs to swim out there in the middle of the river and fix whatever's out there, because we have got a problem." Because they kept saying, "It's their side of the creek," "Their side of the creek." So that's the only other time I can think of that I really had—but this was really a bad problem because it was just very important that these two companies worked together.

But that was probably the biggest challenge I had, and the other was Apollo, I had nine people. We had to staff the console twenty-four hours a day, seven days a week. Figuring out that schedule was really a problem, because how do you satisfy nine individuals? So, being the fantastic manager I was, I put them all in one room and I said, "Y'all solve the problem. It's your

problem. You solve it. If you guys want to man one hour a day, for nine hours, and then come back and do it again, I'll go with it."

I would not let them go over ten hours, because during GT-8, when we had the GT-8 problem, the launch team, we were getting ready to get off the consoles and we went back on the consoles. We were in the process of handover when a problem happened, and we went back on the consoles and put in about a fourteen- or fifteen-hour day, and they came in with some kind of a study after that, and they said, "Don't do that." After ten hours, it drops really off, and after twelve hours, it's just really steep.

So I told them, I said, "You can man anything up to ten hours a day, and I'll let you work at least seven days a week if you want to."

So that was probably the two biggest challenges I had in running that section, was getting the initial scheduling off. I said, "If somebody's got a problem, don't talk to me. Talk to one of your buddies, because they've got to fill in for you."

The only time I worked the console, I would work the holidays. I told them, "I'll work Christmas Eve, Christmas Day." I would take care of those, because that just seemed like a fair thing to do. Because I got all my weekends off, so I told them I'd work the holidays. So that was probably the two biggest problems I had in running that. That came together well, went well. Really enjoyed it.

Then we had a reorganization and I took over the configuration control, MCC configuration control section, which I think is probably one of the most under-appreciated tasks that is accomplished at the control center. If you ever lose track of the configuration, you're in so much trouble it is unreal. If you do not know what's happening when you go drilling that hole, if you don't know what's under it, you can really get yourself in trouble. I had that for about a year, and at the same time we had run Skylab while I was in the RTCC, and after Skylab they had what they called—they had on board Skylab the SO-65 experiment, and they needed to do a data

reduction thing on it, and they were way behind schedule on that. Everything were really messed up. Kranz was calling me daily on it.

When I went in, they had no procedures, no documentation. So I told everybody to stop. I said, "Just stop everything."

"We're going to be behind."

I said, "I don't care. Stop. Take thirty days, come back to me, and I want a decent set of procedures so that what we're doing in Houston is okay with what they're doing in Golden [Colorado]," which was where the contractor was, which would make everybody happy.

So I had that and configuration control for about a year. I got moved up to the branch staff, then I got moved up to the division staff, and I really wasn't totally happy about that point in time. Didn't really feel like things were going the way I wanted. So I went in and talked to my division chief about a transfer, and he said, "I can't transfer you as a 14."

And I said, "Well, then I'll go to a 13."

Talked to a friend of mine in personnel and they said, "No, you don't want to do that, because you give up some things. There's a RIF [reduction in force] coming. Just hang loose, because where you're sitting, you're very vulnerable for the RIF."

So we had a RIF, and I went over to talk to Gene Kranz and got a transfer to Crew Training and Procedures Division, and that's where I finished up my career over there, working simulations. I worked on a second SMS [shuttle mission simulator] trainer. It was a procedures training. I worked on that until budget killed it, and that's where I finished up my career.

Went up to Gene and told him I'd like to retire at fifty, take an early out, and he said okay. Then when the time came, he said no, so my division chief went up and said, "Look, you promised him he could." So he said, "Okay, but this is the last one," and I understand it was a long time before anybody else took an early out. So I took an early out and retired at fifty, and my wife and I have traveled the world since.

RUSNAK: You haven't gone to work for another contractor or something like that, like a lot of these people?

RANDALL: I retired on Friday. I talked to his wife this morning. Sam [Samuel D.] Sanborn came over on Sunday and he was working for Grumman, and said, "Look, I just want you to work twenty hours a week. You can work anytime you want, pay you $85 an hour, and just do it for six months."

And I said no, because the first thing I know it'll be thirty hours and then it'll be forty hours, and then it'll be sixty hours. Because I had seen it. I've seen people do it.

My friend from IBM called me, asked me I'd like to go to work for him. I said, "No, I'm just going to retire." So I did and haven't regretted it.

RUSNAK: Well, if you don't mind, I'd like to go back and ask some last questions.

RANDALL: Let me tell you one thing that was really interesting. I mentioned it out in the hall a while ago, but it was an interesting thing that I really enjoyed. When we started flying Shuttle, we had a lot of nausea. We were flying a lot of people that weren't test pilots, that weren't used to high speed, a lot of maneuvering-type things. You know, we were beginning to get Joe Blow-on-the-street-type people.

So they came out with a program. They said they needed volunteers for a motion-sickness study. I think this probably went on for a year and a half, two years. So I volunteered as a candidate for the program, or a guinea pig, whatever you want to call it. At that time I could do that because the job I had, we ran sims about three days a week, and, really, I could get ready—I guess it was two days a week, we ran sims. I could really get ready for sims, as far as preparation and all that, in a couple of days, so I really had a little extra time. I'd been going to some classes and things like that, learning some new systems, some new software and things.

So when I volunteered for this program I didn't feel like I was bothering my job, because I felt like I could work it in. It was only maybe two or three hours a week, something like that, four hours. But some of the experiments were really wild and really different, and I didn't realize there was levels of nausea. They had them so well-identified that they could take you to prescribed levels, usually. Only one time in my case did it get out of hand. They had a chair like a barber's chair, and they've got all these sensors on you and everything, and you hold a switch. You have to press the switch and hold it in your hand, with your thumb depress the kill switch. What they were doing, they had a shower curtain-like arrangement around the chair, and they were testing patterns to see if there was any correlation-type thing.

We had run several sets of experiments, so this day we were going to go in, and not only were they going to spin you, not only were they going to tilt you, but they were going to change it in 360 so that you got really an exaggerated wobble. But they would do this gradually. They could tweak it so that you did it gradually. And they were talking to you all the way through it. We're whizzing along real good and I forget what degree we were, but they kicked it a half a degree. I think it was in pitch. They said, "How are you doing?" and I said, "I'm doing fine." And I woke up—they had a complete medical facility next door—and I woke up on a table. I had gone to Level 12 just in a matter of seconds.

It made me appreciate what the guys had gone through on GT-8, because I can remember they flew the data back. We got it back to Houston on a Saturday. And of course, my job was to set up. I had control of the control center. My job was to run the control center, so if they were going to apply data to anything—and in the disaster plan, the network controller becomes keeper of the data, which was a real problem during Apollo, which I can tell you about.

But anyway, I can remember looking at the data. Kraft and [Clifford E.] Charlesworth, there was just a slew of people had come in because they all wanted to see the data, because we hadn't seen any of the rates. And it was just unreal, the rates that they pulled on GT-8. It was amazing that they could even function. And the crew credited it to the fact that they had had so

much training in the centrifugal machine that we had at that time. It's now a swimming pool, but at that time. They were getting a lot of training and they felt like they had gotten enough exposure in that, that had helped them accomplish the function of finding the stump thruster. But on Apollo 1, three of us had to translate the air-to-ground tape, and that was tough.

But getting back to the nausea thing, the experiments that they designed, it was really interesting. I mean, there was really some innovative stuff going on. I had forty-two flights on the Comet. We called it the Vomit Comet [KC-135]. Getting to go into zero G, the last, I think, twenty minutes or something like that, of the day, it was free time. You could do what you want. So it was pretty interesting.

RUSNAK: I guess that's just one of those other sorts of things that went on that you never really knew about.

RANDALL: Well, there's a lot of little things you just remember. The first time we were launching GT-6, when the launch plug fell out, I can remember McDonnell-Douglas, I think, was the prime contractor for the booster, and the guy was sitting down on the console and he jumps up and he says, "What happened, what happened, what happened? I don't understand." And nobody knew. Nobody could figure out what happened.

And Kraft says, "Well, by God, I know what happened." This wasn't in his book. I don't know why he didn't put it in. But he said, "I know what happened. The damn plug fell out."

The guy says, "That's impossible." And sure enough, they were—two of the crew—there was a couple of astronauts down there in a half-track, or an armored vehicle, and they pulled up and looked through a pair of binoculars and said, "The plug's laying on the pad." And it turned out that's what—and Chris caught it just right away. I can remember that.

I can remember [Walter M.] Schirra talking to C. C. Williams in the early Gemini configuration control center. The booster console had an astronaut on that console. They did

away with that a little later on into the Gemini program, but the early Gemini flights, there was an astronaut not only at the CapCom console, but C. C. Williams was sitting at the booster console.

And if you'll look in the books it'll tell you that there was only two people in the control center that had air-to-ground, and that was flight and CapCom. Well, that's not true, because C. C. Williams on the booster console, or the astronaut, also had air to ground. Because the guy that Schirra was talking to, all the time they were sitting there—because they did not want to punch out. They absolutely did not want to punch out. And all the time I can hear Schirra saying, "Talk to me, C. C." That's all he said. "Talk to me. Talk to me, C. C."

And C. C. was telling him, "I'm watching it, I'm watching it. I've got it. I'm watching you, you're not moving." And C. C. talked to Schirra all that time. I can remember just plain as day. C. C. got killed later on.

RUSNAK: Well, we're almost out of time for today. I don't want to keep you too much over.

RANDALL: That's probably more than I should have said.

RUSNAK: Well, why don't we just wrap it up here then. I'd like to thank you again for taking out the time this afternoon.

RANDALL: You're welcome.

[End of interview]