

**Oral History Interview of
John Aaron**

**Interviewed by: David Marshall
October 26, 2017
Meadowlakes, Texas**

**Part of the:
*NASA Interview Project***

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This interview features John Aaron as he discusses his early life and his job at NASA. In this interview, John recounts the *Apollo 12* and *Apollo 13* missions and his involvement with saving the missions.

Length of Interview: 03:38:31

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David Marshall (DM):

The date is October 26th of 2017. And this is David Marshall, along with Tai Kreidler, interviewing John Aaron at his home in Meadowlakes, Texas. And I emphasize Meadowlakes instead of Marble Falls because they're just—the communities are right against each other and I think most people kind of just think of all of this as Marble Falls, but you clarified the difference earlier. Meadowlakes is an incorporated town. Can we start out with your full name, first of all?

John Aaron (JA):

Well my name is John William Aaron.

DM:
Okay.

JA:
My father's name was John William Aaron, but when they did my birth certificate, they didn't put a junior on it. So I'm not a junior, but I am the son of John William Aaron.

DM:
Okay. And what was your mother's name, by the way?

JA:
Agnes Melissa Aaron. She was an Eversole.

DM:
Eversole?

JA:
Yeah. Agnes Melissa Eversole.

DM:
Aaron. Okay. And where and when were you born?

JA:
I was born—we were living at Quail, Texas.

DM:
Quail?

JA:
Quail, Texas is—if you go to Wallington, Texas and then head to Memphis, it'll be about

halfway to Memphis.

DM:

Okay.

JA:

So it's in that area.

DM:

Uh-huh.

JA:

And that's where my family, my parents, stayed in that particular area. Quail, Samnorwood, Goode all of that at Collingsworth County. They got—they're—if you're interested in how they got to that foreign country—

DM:

Yes.

JA:

I can—there's actually two sides to the story. There's the Eversole side and the Aaron side. I'll do the Aaron side first. My great-grandfather was called—named Calvin Jackson Aaron, and he immigrated to Texas from Cole County, Missouri in the early—mid—early-eighteen hundreds. He—through circumstances, wound up in Red River County, Texas, where apparently a lot of immigrants worked in Red River County. Married my—married Elizabeth. And they worked their way to—across the Indian territory from Red River County to—they did a stop at Fort Sill to teach school at the Fort Sill Indian School there and I can't figure out exactly—sort out in my ancestry work when they got their exact way or when they made the next move. They did move to Greer County, Texas. Now, if you're familiar with the history of that part of the country, Greer County was a big county, consisting of currently four or five counties and they settled when it was in Texas in the late-eighteen hundreds. I'm still trying to figure that out. Somewhere probably around 1885. Settled down their own section of land that my great-grandfather had got as a part of a Texas land grant, a result of being, I believe, captain in the gould regiment of the confederate states.

DM:

Wow. That's interesting.

JA:

Now, I say the late eighties. I'm still trying to figure that down because my dad's oldest sister,

when you look over her census, she was born, supposedly, according to the census, it just says, "Indian Territory." So now, Greer County, Texas was never Indian territory because it was part of Texas and so she may have been born, either around Fort Sill or in route or somewhere because otherwise—so I can kind of pin that down that maybe they arrived in Greer County, Texas in the mid to late eighteen hundreds. My dad was born in Greer County, Texas in 1894. The reason I'm taking you through all this is that my father's side or my paternal side come from a long line of Methodist ministers and educators and true to form, my great-grandfather, the first thing he did, apparently, was he set up a school in a half dugout. Started teaching. He and his wife, Elizabeth. And then, the next thing he did was build a church. That's kind of what they did. There's a little town and I'm still trying to sort out exactly how this happened. There was a little town that is just east—just west of Altus, Oklahoma. Probably eight, ten miles. That's named after my great-grandfather. And I thought that's where I would find a section of land that he homesteaded on—or not homesteaded, but was granted. But I'm now finding out that likely, the little town was named in honor of him because the section of land that is of trace to him is in Victory, Oklahoma. An old settlement just off the highway on a road from Altus to Gould, which is just about eight miles west of Altus. He then had to take the land that he had been granted. I traced down that he homesteaded on that land in the late nineties, 1890's. I couldn't figure out why he homesteaded. Well the story goes, and I don't have proof of all this, but here's what people tell me. The story goes that when they finally settled the dispute between Oklahoma and Texas and acquired that that wasn't Texas. That was really Oklahoma. The feds actually sent in federal troops to that area to tell the landowner, the grant grantees, that this land wasn't theirs. They were living on it illegally. And that they had one or two options, they could leave. They would allow you to homestead on a hundred and sixty acres and if you homestead on a hundred and sixty acres, they would sell you some of the land around it for a dollar or two an acre. Because I always wondered—the next thing that happened with Calvin Jackson, my great-grandfather, was he moved. He picked up in, I guess, the early 1900's, around 1900, and moved to a place called Salt Fork. Salt Fork community is just right north of Wellington. It's about halfway between Wellington and Shamrock. So I wondered, why did he leave a section of land and go over there? He obviously left his son, my great-great—my great-grandfather—or my grandfather. I'm sorry. He left his son there with my father because my father was born in '94, there. He left them there in Oklahoma, probably just to fulfill the terms of being a homesteader. They had to stay in the and walk the land for five years or so. So, I think then what happened after that, because I did find the homestead records where he homesteaded. And I found a record where one of his family homesteaded a hundred and sixty acres right next to it. So I think I have sorted this out that they lost their land and I would suspect the reason he went to Salt Fork, Texas, he was probably very upset about what happened. About how he lost that land.

DM:

Right. Was—

BT:

So he moved to the Salt Fork area and then my father's father eventually moved over with him. He was a minister. He was—my father's father was a circuit writer preacher.

DM:

He was a Methodist circuit writer?

BT:

Methodist circuit writer. And when you look at your grave, you find the little plaque, being a circuit writer, because my dad used to tell him a lot about his father was gone most of the time and left him and his brothers to farm all that land.

DM:

Did you ever hear any more about the Indian school at Fort Sill? Was there any more? Any other documents or any other information on the Indian school? And if it was Methodist affiliated or—

BT:

Well the family story is, although I don't—I tried to find records of the Indian school. It thought they might have a ledger of who all taught there.

DM:

Right.

BT:

I have all the leads to go around it, it may be buried somewhere shoebox in the archives at Oklahoma City. The only story that I know about that is that there was always a story in my family. I'll underline the word, 'story.' That one of dad's sisters went to—it may have been Aunt Ruth—went to school with Quanah Parker. You know, Quanah Parker, was raised and educated and he went—Quanah Parker, the Indian leader—was raised and educated in Fort Sill. Attended that school.

DM:

Wow.

BT:

And was there, I guess, the same time Calvin Jackson and his oldest daughter were there. And the years kind of fit. My Aunt Ruth, who was the oldest in the family, could have gone to school with a young Quanah Parker.

DM:

Wow. Golly.

Tai Kridler (TK):

So when did they arrive at Fort Sill? Roughly? Again?

JA:

You know, I don't know.

TK:

Okay.

JA:

I'd have to look up what it is I know about that because I've written it down in various places, but I think they arrived probably around 1880, 1881, 1882. It was in that period.

TK:

And Aunt Ruth was their daughter?

JA:

And so I can run that down maybe by going back and refreshing my memory of when my Aunt Ruth was born. The one that was born in Indian territory.

DM:

If you uncover anything like that or any other information, we would love to know about that. That's another area of interest.

JA:

Yeah. But it was a well-accepted story in my family.

TK:

So we can—we may presume then by virtue of your great-grandfather and great-grandmother teaching there that she also went to school there at that same institution. That's huge.

JA:

Yeah, with Quanah Parker.

DM:

Yeah, that's interesting.

JA:

Now, if you look up the history of Quanah Parker, you can pretty well nail down when he was there—

TK:

He was there.

JA:

And of course, that's where Quanah Parker is buried. He left to go lead another campaign. Wound up on a wrong end of a rope, I guess.

DM:

Well you know, that's a whole other interesting aspect of your life, really, that we want to explore a bit more. Let's go ahead with the family history a little bit first. Let's come back to that because this idea of the Comanche frontier to the space frontier is something we want to talk about a bit more.

JA:

Okay.

DM:

Yeah, continue with your family.

JA:

So then my grandfather moved his family, eventually, over to the Salt Fork, Samnorwood community and so forth. He was a minister. He travelled all around and was well thought of in the county. I read the obituary about his funeral. A paper in the Wellington Reader. A paper about when he died. When he died and they held his funeral, they turned out school in the whole county. Now, that just blows my mind. But he was well thought of and a leader in the country. My father and how he wound up meeting my mother, then. My father and his brothers and their father formed a cattle partnership, but my grandfather, the minister that I just talked about, he fell in bad half with asthma or something and thought they would do better if they went south to South Texas to maybe be easier on his health. So they came down and set up an operation here, down around Burney. In Bee County down there and that's where he met my mother, who was an Eversole, and they married there and then they were—lived there a few years in part of Texas and then the partnership decided to move back to the Panhandle of Texas. My mother had never lived where the dirt walls and the droughts and all that were. She said, "You know, how did I wind up back here?" She wrote a journal of her life that I've got on a PDF document. I could send it if you're interested.

DM:

Oh yes.

JA:

Most people—a number of people have interviewed me are more interested in her life than mine. But so they got married. They came back and started having—raising their family. Didn't have anything. The partnership broke up. They got caught up in the crash of '29. The Great Depression. It wasn't until 1948 that my father was able to get enough stuff together to even own a piece of land. They were sharecroppers.

TK:

What were the crops up there?

JA:

The crops were mostly, when he was doing that, was cotton. He didn't have—he wasn't in—he didn't have enough area to be into cattle. He later migrated to his real passion and that was cattle, but he believed—he taught me about diversification. He believed that you had to have something going in multiple commodities in case—to balance out the rest. So he would either get into cotton quite a bit. ____ [0:16:43] and when he felt that might work. Or cattle, that he build cattle. Or he thought if the hog prices got way down, he'd go get in the hog business because he just had this idea of how things cycles. You know, and there were no safety nets in those days. There wasn't any safety nets. So they were sharecroppers. They moved. They tell stories of moving at least every two years because the landlord would decide to have somebody else. It wasn't until 1948 when they moved south of Wellington that he owned a piece of land. Now, he started, since he was a farmer, and you know how labor intensive farming is, he started having girls. They kept trying to have boys. Well, you know, when you've got—you make work with what you have so my older sisters were involved in farming and they were—my oldest two sisters were old enough that they farmed with teams. Horses, you know?

DM:

Yeah. They were plowing, huh?

JA:

Yeah. They had the horses and teams. By the time I came along, you can tell, we had a little Ford tractor. So I learned to farm a little Ford tractor and I learned to farm very early because I mentioned that my fam—my dad's passion was cattle. He focused on buying and selling cattle all across there, that county. But he would have to sell off what he had to then start the crops in the spring. That wasn't what he loved to do.

DM:

I see. Right. Yeah.

JA:

So as soon as I got old enough almost to drink coffee, he had me on tractor. In 1954, I was twelve years old and this is the thing that just mind boggles. I was twelve years old. I think my dad kind of saw that, of course, the droughts in that part of the country was a major problem there. I think he probably figured out, well, it's probably not going to be a good year for cropping for cotton. He decided that he wasn't going to quit buying and selling cattle and so he put me on that tractor and I farmed that hundred and sixty acres.

DM:

Pretty much by yourself?

JA:

Yeah.

DM:

Wow. [laughter]

JA:

So I was what? Twelve years old?

DM:

Twelve.

JA:

Now, it was a little old bitty tractor. There wasn't any issue with the—but the thing I look back, that and other things, shaped my career along. I worked at it. See, to turn a twelve-year-old loose on a tractor to put in a cotton crop is unheard of. But I would plie after school in the spring and I finally got out of school and then I planted the cotton and worked the cotton. I'll never forget that year with a little old kit. I remember this conversation. I started planting cotton. Of course, a two row, little Ford tractor, you don't plant much cotton in a day. So I had been planting cotton for a couple days. I remember sitting at the breakfast table and my father came in from the barn and he was getting ready to go to work his cattle yard. He had a cattle yard in Wellington. My mother, you know, she said, "Bud." Everybody called me Bud. "Bud, you've been planting cotton for two days. How deep are you planting that cotton?" I raised my hand up. I'll never forget. I said, "Oh, about that deep." She said, "Bud, that's pretty deep to be planting cotton." Now, you got to remember, I had little bitty hands, and so I just kind of dropped. I guess my father heard the conversation kind of drop and so as we were clearing the dishes for breakfast,

she said, "John." Dad's name was John. "John, you better check on this kid before you leave today. He may be planting his cotton too deep." So meanwhile, I went to the field. My dad, I guess he finished up around the barn and I was plowing a field that was next to Turn Row, where he drove up to get on the main highway and so I was about halfway down a long row and here came my father. I saw him stop his vehicle. He got out. He went and got in the furrow. Dug down to see how far I was planting that cotton. Covered it up. Went over to the next furrow. Scratched it. Saw how deep it was. Covered that up. Then he just looked up and I was looking back at him and he said—he just gave me a big hand wave and took off. [Laughter] The—now, the unfortunate thing about that is I planted that whole area in cotton and it never really rained. The cotton came up and I ran what they call a go-devil. You know what a go-devil is. I go-devil over it one time. It never really rained again really. The weeds never come up. So I didn't have much work to do with that cotton patch and at the end of that fall, we went out and pulled that cotton because we always pulled cotton. That's what my sisters and I did, pull cotton. I think we pulled one bail of cotton off that whole farm. That is how bad it was at 1954, but he kept trading cattle the whole time. So that—the fact that they would put that with me for that responsibility in 1954, when I was born at '42. They were just example after example like that and—

DM:

Made you grow up fast.

JA:

Well I grew up fast. I learned a value of stuff. We didn't have anything so the other thing that happened is I learned—I got interested in mechanics and found out I had a lot of mechanical capability. I could fix on anything, work on anything, over haul anything.

DM:

Did you have to work on that tractor? Keep that tractor running?

JA:

Yeah, I did. In fact, when I was fourteen—I don't know if it was the first I had ever over hauled the little Ford tractor because that little Ford tractor, if you wind them hard, the engine would need over hauling every year. It was interesting. It would need a sleeve kit. I took the thing apart and put a sleeve kit in it and a new set of bearings and all that and I was fourteen years old and I'll never forget, I put it back together and my dad came and helped me pull the tractor to get to storing because it was still kind of stiff and I cranked up. It didn't have any oil pressure. He looked at me. He said, well what happened? I said, I think I know what happened. I had a tub, a number two wash tub that I would pour—I hate to tell you this—I'd pour gasoline in that wash tub to wash the parts. Now, a knowledgeable person wouldn't do that today, but that's what we washed parts in was gasoline. I mean, so I said, "Dad, I think I know what happened." So I went back and I looked and felt around that wash tub and pulled out the pump. I had forgot to put oil

pump back in that little old Ford tractor engine and sure enough, I tore it all down and put an oil pump back in there. Cranked that thing up and farmed another season. So I was—my dad was an interesting person, in that regard, that he could show me kind of how do something, but he couldn't do it himself, mechanical. He just—if it didn't go together just quite right, he just didn't have any patience. Well I had tremendous patience. If he just kind of tell me kind of what to do, I'd just go out there and figure out how to do it and if it didn't work the first time, I'd just take it apart and work at again and so I did that all the way through my career. Combines and trucks. So, you know, it was—it almost makes it sound like I grew up unsupervised, but I was very supervised.

DM:

They put a lot of faith in you, that's for sure. I mean, they put a lot of responsibility on you. Did you realize, at the time, that you weren't like so many other children?

JA:

No.

DM:

You just figured everybody was that way?

JA:

Yeah. You know, that's kind of what—I don't know that I thought about it. It—didn't ever have time to think about it. You know, we never took vacations. That's the other thing about NASA. See, by the time I got—when I got to NASA years later, I didn't know there was—I never really felt there was a concept of working eight to five. See, on the farm, I mean, without any kind of a good set of equipment, you just worked all the time. It was so labor intensive. You worked all the time. So you worked from when you got up until when you went to bed. Daylight savings time was defined as when the sun was shining because that's what we worked. So you never thought about just working—just naturally, you worked from daylight until dark. My mother would always pray for rain because that means you couldn't farm that day, but guess what you could do when it rained.

DM:

What?

JA:

You could build a fence.

DM:

Okay. [Laughs]

JA:

When it's too wet to plow, we usually mended fences or go find three or four cows that had got out somewhere and took off. Now, that is—so it—working daylight to dark. I know, at one time, my father had decided it was a year or two—this may have been 1955. Maybe '56. He had decided that maybe the drought was about to break, probably, and had started leasing more cotton ground. So there was one time I remember in particular, we had at least a hundred and sixty acres about three miles from our house. When it came time to work on that—of course, I'd have to take the tractor over there and then plow all day and then he would come by and pick me up and leave the tractor there. But in the meantime, I would go over there and farm that cotton ground and I would make me maybe a sandwich. Taking a can of Spam or a can of pork and beans and I'd always lay the can of Spam on the pork and beans right up on top of the engine so that when I stopped for lunch, I'd have something hot to eat. So I would go do that all day, up two or three miles from home. I was just thirteen, fourteen years old. Now, when I was fifteen, my mother—my mother started—my mother was a minister and so she started preaching over a little town of Vincent, Oklahoma. We would drive over there and attend church and then usually, just you went to church on Sunday night, as well. We would stay with one of the neighbors and one of the church members and had lunch in the afternoon and then have the church service that night and drive home. Anyway, that put us in connection with a rancher there, and he had a farm down on the Elm River. A place called Bugger Holler [?] [0:30:40] and so we went off down there and bought that land.

DM:

Okay. Same kind of country, though? Same kind of soil?

JA:

Same kind of country. It's right next to the county line. This and Oklahoma is three miles from the Texas border. Twenty-four miles east of Wellington. So that's how I got to be at Oklahoma and I continued there, but before I got to that, one of the things that shaped my life is that although my father never received a formal education, looking back, he was a very wise man. He was full of a lot of wisdom about things, about people, about what it takes to get by and so forth. He knew everybody in the country. He, even for a cattle trader, he was impeccably honest. People trusted him. So I was—I started school and I didn't like school. I started school, boy, in '48, maybe, and I didn't like school. I didn't like to go to school because having six older sisters, by the time I come along as a boy, that was something precious in that family, obviously. That was a major event. So my father, the story goes, he couldn't get me to get on the school bus. By that time, I was living over there south of Wellington and I had to ride the school bus to Dawson, Texas. Now, Dawson, Texas on the map is right on the line. I just didn't want to get on that

school bus. By the time—and so he would often, when I got to be in the third or fourth grade, he would give me a whipping to put me on the school bus and he got tired of doing that apparently. So when I was in the sixth grade, I had missed—the teacher reminded me of in nine months of school, I had missed three months of school because my father just decided, I guess he was going to let me go. I went with him everywhere he went. We had—on Mondays, there was a stock auction in Wellington. Of course, on Saturday, there was one in Hollis, Oklahoma and so forth. So I went everywhere he went. So I travelled the country with him and he would talk to me about things. He would point out things. He would point out people. He talked to me about the fact that one of the things that he taught me I've already mentioned, about the value of diversification. That you can't just put all your eggs in one basket. You got to be prepared in a lot of things. He loved to trade. He would—he also instilled in me about—a lot about human nature because he would point out—we would drive by farms or little ranches, where he'd say, you know, you know, see that group over there? He says, "I know the history of that. You know, a man and his wife that I knew, they started that little operation and worked all their life to build it up," because you could spend your life building a way to make a living if it involves land and cattle. And then he would tell me—I said, "Well how did that happen to it?" He said, "Well they raised some kids and the kids didn't appreciate all what their parents had put in it and he said, you're going to learn in life, son, that you'll see cycles. The cycle that one generation makes it, the next one poofs it off. So he instilled a lot of wisdom in me.

DM:

That was a good education in itself.

JA:

It was a tremendous education. See, I think I was lucky. I've thought about this a lot. I was lucky in that I grew up and my parents were almost old enough to be my grandparents. They're not like so many young parents today that start raising kids before they're even raised. Their parents are trying to find themselves at the same time the kid is. My parents were old enough that they had already figured out the world, pretty much, and were comfortable in their skin. Knew what it took. He knew what their expectations were. And they—my father, he just morphed that on me. So that was the sixth grade. Now, you'd say, okay. You were on your way to being a juvenile delinquent, which is not a word you hear anymore, but my sisters and others would look at me a lot of times and they convinced I was going to be a juvenile delinquent, but something in my life changed instantly. There was—I started the seventh grade. There was a brand new male teacher because I had had female teachers up to that point. A new male teacher came to town by the name of Ted Parker. And for some reason, because nobody else had been able to do this, he put the fear of God in me, and he put the fear of God in me at the point that I said, I'm afraid of failing.

DM:

How did he do that? What did he say to you? You remember any specifics of that?

JA:

No, I don't.

DM:

Okay. But anyway, that was a turning point.

JA:

It was a turning point.

DM:

Wow. Influential fellow, then, to be able to turn a child around like that.

JA:

Well he triggered something in my sight, I guess. I had—and my daughter's the same way—I, like some people, the biggest motivation that I ever ran across for myself was the fear of failure. Boy, it's a great motivator. I will do anything to ward that off. I think he triggered that. I was scared to fail. So I had him for two years and it turned me around. I started learning how to write. I started learning about arithmetic. I mean, reading and writing and arithmetic, which is so important. There are many events like that that just came along.

DM:

Otherwise, you would probably still be farming, possibly, or ranching, you think?

JA:

Well yeah. Might've been in the penitentiary. I don't know. I mean, they were concerned about me because I was spoiled. I mean, I admit that.

DM:

Well, in a sense, but you were also hardworking. [Laughter]

JA:

But my sisters, you know, they said I was spoiled because I could get by with anything.

DM:

Oh. [Laughter]

JA:

Well that got me to my ninth grade and then I went over to Vinson.

DM:

For high school?

JA:

Started high school and I started doing better. Never really applied myself. The little school I went to only had nine in my class. Nine people. Four boys and five girls. The—when I graduated from high school, I didn't—you know, I hadn't—they didn't have many courses to offer, but I had just—I had enough capability, I guess, to be a valedictorian. The valedictorian of the class and would have graduated as a valedictorian, except that they gave me points on attendance and so the girl in the class, who would've been the second, beat me out because I had missed too many days of school. There was always something more interesting to do. Particularly, in the fall. You know, bird hunting. Coyote hunting. It's amazing what they let kids get by with in those days. I remember one time, the boys in the school decided that we were going to go coyote hunting, and that we were going to need some horses. I remember saddling up the horses, putting it in a trailer, driving up to school, checking in so that we'd get the attendance recorded and get the money associated with that because schools rewarded based on attendance. Maybe still are, I don't know.

DM:

I'm not sure.

JA:

Yeah. They lost money if I didn't go to school. State blame. So go up there, we went out trying to set up and call out some coyotes and then went back to school, checked out, and went home. That's how bad I was.

DM:

Did you notice any aptitude towards mathematics or anything that indicated?

JA:

Yeah. I noticed an aptitude for mathematics because I had no issue. I mean, of course, I didn't take much math in high school, but I had no issue doing it. The one thing I picked up that has followed me through my life unto this day is that when I was a little kid, all the way through to now, curiosity. I was curious about how everything worked. Mechanically, everything that was around, I would take apart. The family couldn't even keep a clock running, those old clocks, because I'd take it apart and try to put it back together. Well, a clock is not all that easy to put back together because you don't have the right tools. The story goes sometimes when I was just

way early, maybe six or seven years old, my dad one time, went out and started up the tractor to go to the field and when he took off the implement, the whole part just fell apart. I had taken all the bolts out of the cultivator. Now, I remember one time I got interested about mosquitos. Just was a kid. How in the world can a mosquito sit on you and bite you without you figuring he's there? So I read up on it. So everything that I—I wasn't comfortable being around anything if I didn't understand how it worked. It is still a characteristic of me today.

DM:

It reminds me of the story. We'll come back to this story, but it reminds me of the story of you seeing telemetry anomaly a year before *Apollo 12* and taking the time to trace back. What on earth caused that? I think you, from what I've read, you spent quite a bit of time tracing back to the SCE auxiliary.

JA:

Right. Spent all day.

DM:

Switch. So it's that kind of thing?

JA:

It's that kind of thing.

DM:

Yeah. That's really—

JA:

Now, when you have that passion to understand everything that's around you and I'm still that way today, that's a perfect mindset for an engineer.

DM:

Yes.

JA:

That's how to become the engineer's engineer. The engineer that the other engineer's go to.

DM:

But you couldn't have really—you couldn't have really known that when you were a kid.

JA:

No, no. I didn't know that I was going to be an engineer. I just knew I was curious.

DM:

Yeah. Was it when you graduated? You went to college pretty quickly, didn't you? Did you go right over to Bethany? Didn't you start at Bethany?

JA:

Um-hm.

DM:

Did you go right out of high school?

JA:

Yeah, the fall. I graduated in the spring. In the fall.

DM:

Did you know what you were interested in?

JA:

Yeah.

DM:

Really?

JA:

Yeah. In fact—well—who was it? Oh, Southwestern in Oklahoma wanted me to answer some interview questions about—because they're on the same thing. How is it that—they were publishing – they're trying to do a study about regional universities versus big research universities.

DM:

Right.

JA:

And so they asked me a bunch of questions because I went to a quote, "regional university," and wound up with a successful career. So I wrote that story up and I'll print it out for you. You can get it too. So it's kind of a rough draft. There's two or three things that are probably grammatically not correct, but I'll give you a capsule. I look back in this, you know, and I tell kids today, you know, prepare yourself. Learn everything you can because you don't ever know what opportunities are going to open up for you so don't ever get your mind set around something, I'm not going to learn that because I'm not going to need it. That is—don't ever get your mind in that kind of thinking because you—when you're a young person, you think in terms

of what's going on around you. Now, of course, today, it's a lot easier with all the _____ [0:45:29]. When you grow up on a rural setting like I did and watch your parents and everybody around you scratch out a hard scrap of living, the first thing I learned from my father is, "Son, you can't start being a rancher from scratch. If you don't have the land, if the economics are such that you can't buy the land and buy the herd, play all those mortgages, and still feed yourself. That's probably still true today, if you don't have the land. So my father introduced me to economics. Most parents today have never even taught their kids about money or economics. So when I was in high school, it was just expected that I was going to go to college. That write up I'm going to give you is about how it is the parents scratching out a living and I had hard scrapple country, got their kids all educated. Neither one of them went to college, but they felt so committed to the value of an education that they were bound and determined by hook and crook that we go to college. And the way that worked and you'll see it is in this write up I'm about to give you, it worked because my oldest sister Ruth, who was eighteen years older than I was, she started college almost the day I was born and she went to Canyon. What's the name of the university?

DM:

West Texas A&M, back then, I guess. West Texas A&M? West Texas State.

JA:

I think it was West Texas Teachers College.

DM:

Teachers College.

TK:

Back in the day, it was West Texas Normal and then it became the college. Yeah. WTC.

JA:

The story goes—and my grandmother told me about her because my father—this was in the early forties. I was born in '42. Early forties. My grandmother, on the other side, told me this story that my oldest sister didn't want to leave my father and mother because she was integral to go to the farming operation and so Ruth got in her head that that was what was going to happen. My grandmother told me that he told Ruth, she told Ruth, "Ruth, your father really wants you to go to college. Don't worry about him. They're going to be all right." So they—she packed up a suitcase, got a few dollars from somewhere. I don't know where they got it, but she started at Canyon. She made three years, or maybe two years, at college. The war caused a major teacher shortage because all the men went to the war and there was a superintendent from down around North Field Texas, which is in Motley County, down there next to Turkey. You've probably heard of Turkey, a famous place. Came up and offered her a job to teach school. She went to

North Field, had a paying job, went to school in the summertime to continue her education at Canyon and by then, my next oldest sister, Grace, who was two years behind her, it was time for her to go to school. So my oldest sister supported the finances of my younger sister. That started a chain of events. That then was the sequence that each one, if they—well, we were about two years apart—each one, when they got ready to start school, the previous one would help them.

DM:

They learned a work ethic also, didn't they?

JA:

Oh, a lesson. Yes. So when it came time, it got down to me, my sister Ruth, again, because she always looked after me. She was always mentoring me to—motivating me. She was convinced you ought to play the piano. I mean, take piano lessons. Voice lessons. I mean, everything that came along, she would get me involved in. Didn't always work. So it kind of came time to go to school. Still didn't have any money. I didn't have any money. My dad and mother by then were getting older. Getting harder for them to farm. This thing out or something?

DM:

It's going. Yeah.

JA:

She had had a bad experience in her life just then. She had lost her husband at a very young age and she had two small kids. She decided right after that that she was going to go back to school and get an advanced degree. She was teaching at Dotson, an advanced degree. She made me the offer about going to college. She said if you will come with me in Bethany, Oklahoma, and if you will keep my house clean, look after my two kids, young kids, when they get out of school—because they were like in first, second, or third grade. I forget which. You'll look after them and cook the evening meal, I will pay your tuition. Bethany, in those days, was fifteen dollars an hour. That was a lot of money as compared to a state school, four dollars an hour. So I took her up on that and so I went up there and enrolled in college and I'm getting a bit ahead of myself, but they assigned me an advisor. Maybe you've read this story.

DM:

I don't remember it.

JA:

Yeah. Well they assigned me an advisor because in those days, when you started school at Bethany, maybe they still do, they assign you an advisor and he interviews you, looks at your transcript, tries to figure out what you're about. He asked me, he said, which explains—got a little way into the interview and then he asked me what I wanted to be. Do I know what I wanted

to major in. I said, "Yes. I want to major, a double major, and I want a degree in a major in math and a major in physics." He looked at my transcript and he says, "I can't let you do that." I remember this conversation just as plain as if I had it today. He said, "I can't let you do that. I said, why is that?" And he said, "Because you don't have any background in that. You haven't taken a single physics course and you got one semester in algebra and plain geometry."

DM:

Did they even have a physics course at your high school?

JA:

No, they didn't have a physics course. I mean, it was a class of nine. Knowing that—my grades were okay, but that didn't mean much when you graduate with a class of nine in a small school like that. So I challenge him again. So finally, I just ask him, he said, "Based on your transcript here, what I would recommend if you want to go to anywhere near that, you ought to get a degree in business." I thought, Well a degree in business is not what I'm—it's not strategic to my plan. So finally, I just asked him, "Sir, there's no way you can stop me from trying this." He said, "Well actually not. Actually not. I can't stop you from doing it, but I can tell you that at the nine weeks point because you'll have to come back and get your grades from me. They don't mail them to you. You get them from me. You'll be on probation." I said, "Okay. I want to do it." So he and I sat down there and you can imagine that I was starting from nowhere, that I was going to start out on makeup courses so he picked out four sites in math related subjects and US government history. That was the five subjects I signed up for and I went on my way. I went back at the nine weeks and he sat down and he opened up my grades and he says, "You're going to have to explain something to me." I said, "What's that?" He says, "I don't understand. I don't understand how in the world this could happen." He said, "You've got five grades here. You've got four A's and an F. Your F is in government. I want to know what's going on." I said, "Well I think I got that figured out and I can make that up." He says, "You're not—you can't make that up. You've got a fifty-four average at the nine weeks." I said, "I got it figured out. I can make it up." Then he said, "Well what's going on in government?" So I told him a story about the government professor. That government professor was actually a grand nephew of old caption Jack Garner from south Texas and all he ever talked about was his uncle vice president and then he would give us all these crazy tests. Most of the class was flunking. I wound up with a B in that course. It only could happen because the final counted double and I aced the final and I won't bare you how I did that, but it involved a girl. [DM laughs]

TK:

Well now, maybe we want to hear that. [Laughs]

JA:

Well now you got to hear the story.

TK:

Now, we got to hear it.

DM:

Tell the story. [Laughter]

JA:

But it's not what you think. There was one person in that class that was acing all of his tests and it was his secretary. He had a student as a his secretary and so one day, shortly after that or maybe it was just before because I think I told him I had it figured out. I ran across her in the student union and I bought her a Cherry Coke. Cherry Cokes were big in those days and I was sitting down and chatting with her in the student union and I said, "Tell me something, that professor gives the wildest tests I've ever run across." I said, "He just gives you a test and it's hundreds of government questions and they're all true false. Now, that's a tough test. Where does he—do you help him make up those tests? Where in the world does he get that test?" She said "Oh, he doesn't make those up." He said, "Those are out of a study guide on US history." I said, "Oh okay, well where is that study guide? Is it here in the student union?" Said, "Oh no, you can't get it here. You got to go to Southeastern," I think, which is in Ardmore, Oklahoma or somewhere there. You can buy one over there. So I drove to Ardmore, got that study guide, brought it back and at the end of every chapter, there were just hundreds of true false questions so I just memorized them all so I aced the final. I made a B in the course. Well that—I then—of course, that was at—I finished that semester in Bethany. Still primary work and makeup courses on math and science. And then I moved down to Weatherford and I moved down to Weatherford for two reasons. Again, it was financial motivated. Four dollars an hour semester wise. It was closer to home. I could commute home on the weekends to work to make money or help my father and mother farm. And if I had any time left over, I'd go find a job. So I did not get the traditional college experience of social. I was a—it got to be known as kind of a suitcase college, but I lucked out. Southwestern, then, was known for two things. It was known to be a teacher's college and it was known to be a pharmacy school. Weatherford, Oklahoma, and maybe it still is, it was the premiere place where you go get a pharmacist's degree. Now, I got ahead of myself here. You said, how in the world did I decide to go into math and physics. I knew what I wanted to do, but I knew if I was going to be a rancher, I had to have a paying job to feed myself because as I said, you can't do it without some way to support yourself and so I said, I need a paying job if I'm going to do this. So what is there in a rural environment that has a paying job? Teaching.

DM:

Yeah. And your sister had already shown that. Your sister was a teacher. Your oldest sister.

JA:

Yeah. I came from a whole lot of teachers and educators. I said I don't want to major in what they majored in because they all majored in English and Literature. They spent all their time grading tests. I want to do it in math and science because it's easy to grade the tests and you don't have to have people write things. Anyway, so I picked math and science because I said it's easy to grade the papers and if you've got a math and science certificate, any school that you run across is going to hire you because they all need them. I'm going to have a job no matter where I settle. So, what about physics? Well I've hardly ever heard of physics, but there was a boy who graduated at Vinson two years ahead of me. I heard, I didn't really know him that well, but I heard that when he went to college, he decided to graduate—he decided to get a degree in physics. I thought, Oh that sounds cool. Little did I know what I'd get into because that's—from a dead start, that's a hard curriculum. So you know, I backed into what I wanted to get a degree in. I backed into it just based on logic of I wanted to be a rancher and didn't have any land. Didn't have any cattle.

DM:

Did you have an aptitude for mathematics and physics, though? Once you got into it, did it come easy or was it a lot of difficulty?

JA:

Yes and no. So I started at Southwestern and that's where it really first hit, physics and math. Bethany was mostly prep courses. I hit physics and math. First degree physics and first degree algebra and boy, did I struggle. Boy, did I struggle. I mean, but you know, I got through those courses and one of the proudest grades that I ever had that I remember was algebra because that was when I hit not only just arithmetic and numbers, I hit theory. You know, mathematics is about theory. So that was a whole new concept and I had struggle with that. I managed to work my tail off and got a grade I was very proud of. It was a C. Same thing in physics. I think the first physics score I took was general physics and I got a B out of that. You need a mathematics to do physics. Fortunately, the instructors that I had knew a lot of us were struggling. A lot of their students were struggling, just like I was. So they taught you mathematics along the way, but you can't understand—you can't do physics if you don't do math and so they would teach you about the math you would need in a certain chapter. It's part of them teaching the chapter on physics. So I learned a lot of math from my physics teacher. And to answer why I said yes and no. Yeah, it was a very hard start and I spent all my time trying to figure out how to get over the hump, but once I got into it, it got easier. The further I went in mathematics, the easier it got. So I have an aptitude for it and I have an aptitude for physics, primarily. First of all, I'm so curious and it's about the physical world and there's a lot to be curious about.

DM:

Right, right. Yeah.

JA:

So I discovered at Southwestern State University in Oklahoma, I had a sleeper department. It was a physics department. It was a little tight knit group, but professors were excellent mentors that wanted to help you. It was a tight knit group. We would all study together.

DM:

That's good.

JA:

And so I felt I developed a passion for physics. Took every physics course they offered. When I graduated, I had way more hours in physics than it took to get a degree and then I discovered the downside of that. I was married at the time. It was in my senior year. I went over and said I better start thinking about how to get a teacher's certificate because you got to have a special education certificate to teach and discovered that I could not cram enough of those education type courses and still graduate in four years. You know, I was just kind of living in a cocoon. That's the only kind of way I can—I didn't have any social life before I got married. I didn't have any school life outside of my studies because all we did was study. I had to. So and I'll tell you a religious story about that. So I went home and discussed it with Cheryl. Cheryl and I had just been married a month or so. I said, I can't—I got to figure out how to graduate. I mean, I need to get out in four years and get a job. We're broke. We don't have any money. I said, I just got back from the registrar's office and I can't get a teacher's certificate. I can graduate, but I can't get a teacher's certificate. She said—I said, you know, I hear that NASA—there's a place called NASA. I'll say it that way. There's a place called NASA that is hiring people and I'm going to—I think I should apply and if I get an interview and maybe a job, we can—I can go down there and start making some money. I can save some money and save up and then I'll work on my teacher's certificate at night and then we'll come back and start ranching so that's what we did. I sent out an application and they didn't even interview me. They just sent me a telegram that I had a job.

DM:

Really? Wow.

JA:

I sent in an application and a transcript and they sent me a telegram.

DM:

Golly.

JA:

And I'll never forget the telegram. I wish I had kept it. I looked at how much they were going to pay me a year and I looked at that and I said, boy, that's a lot of money for a country boy. It was sixty-seven hundred and seventy dollars a year.

DM:

Yeah. What would a teacher have made at that time if you had gone into teaching?

JA:

Well probably three thousand, maybe.

DM:

Yeah, yeah. So this is a hot shot company, this NASA.

JA:

Well it turned out that they hired a lot of rural background people just like me to go to NASA.

DM:

Purposefully? Did they target rural people, do you think?

JA:

Well it was kind of a bootstrap maneuver because some of the people that had left a year ahead of me got down and got at NASA and got well respected and then they started reaching back into the university and just hiring people along. They were hiring people on word of mouth.

DM:

Wow. You remember some of those people that were at Southwestern and went to NASA around that time?

JA:

Yeah.

DM:

Do you remember some names?

JA:

Yeah, I do. I could if I thought about it. I'm not good on names, but I could give you a whole list. Well anyway, it started a whole migration because I found out later, NASA officials and myself and I agree with this, you know, because later on in my career, I started hiring people and bringing them in and mentoring. I'm still a born teacher. I can mentor the engineers. In addition

to just being their supervisors, I could mentor them because I remember what it meant to me when I got there. The people—young students who come from a rural, kind of, hard scrapple background tend to come with the work ethic. The work ethic and they usually come with a solid education. In other words, they're not a specialist. They're not someone who has applied through some nitty gritty research angle. They got a very good general solid education.

DM:

I was wondering about that.

JA:

When you get out of college, you're just—the only think you proved is that you know how to learn because when I got to NASA, guess what? The learning never stopped.

DM:

Oh, yeah.

JA:

We didn't know how to do what we were going to do. We just—you just learned about how you might could do it. You researched it and then you studied it. You talked to people.

DM:

It sounds like they wanted people to come in with an open mind instead of specific—instead of tunnel vision.

JA:

A niche, yeah.

DM:

Yeah, a niche.

JA:

And it turned out taking all those subjects of physics. See, one advantage of a physics career or one attribute of a physics career is you come out of college with a very general background of everything. Mechanical systems, electrical systems, electronics, thermodynamics, optics. It just turned out that was the perfect niche for me because of my curiosity in not only how things worked, but how things worked together and so I knew a little about—I knew enough about every discipline that makes a space craft. To build a spacecraft out of and I knew how the disciplines interacted. How thermal systems interact with electronics. You know, the environment deep space. How hydraulic systems work. So, I was in mission control. Well in mission control, I was responsible of on the Gemini, Apollo systems for all of the subsystems in

a spacecraft. The only subsystem I wasn't—didn't have a responsibility to learn and monitor and make decisions in flight on was the guidance system. Environmental control, the telemetry systems, the communication systems, the thermal systems, the life support systems.

DM:

All of that.

JA:

Everything, and so—

DM:

Wow. How many people were mentoring you here? I mean, you—the training continued, as you said, the learning continued. Were there individuals who you can name that kind of guided you into this or that? Or were especially influential?

JA:

You know, the mentor—of course, I was surrounded by some mentors, but I was always surrounded by people just like me, who were trying to figure out how to do this together. But Army Aldridge, who was my first supervisor, was a big mentor to me. Everybody that was in my chain of command was a mentor. Chris Craft, the guy that invented the whole space line operations thing, was a tremendous mentor. You know, he's a tough master, but a good mentor. NASA was unique in meaning that this group all formed together. It was just the right mix of young graduates and sprinkled with a few good mentors and managers. Just about the right ratio.

DM:

Wow. Was this planned or was this happen stance that it just came together right?

JA:

Well it sort of just happened. For example, one of the biggest mentors in my life was—let's take the communications system and telemetry system and so forth—it just so happened that NASA went to Philco. Remember Philco radios? Yeah?

DM:

Oh yeah.

JA:

Philco had a bunch of engineers that had worked the radar systems and the Dupine [?] [1:13:54] radars in Canada and all that and they were good communications people. Voice, telemetry, radars. They hired some of those guys, and they were just about ten, fifteen years older than us. They hired a bunch of those guys to come in and be tech reps to mentor us and boy, I glommed

onto a couple of those and they—I just drained them of all their knowledge of communications and telemetry.

DM:

There's the curiosity.

JA:

Because they had done some miracle things up there. It's back to the curiosity thing. The other thing that they did is they brought in a sprinkle of the industry engineers. Senior industry engineers. And set them down with us from McDonald Douglas, for the Gemini and then when that come along the Rockwell. _____ [1:14:55]. We'd all sit together, see?

DM:

So that's exactly what NASA wanted you to do was pick their brains and draw all of this new information. What a training program.

JA:

Well and then you spent all your time learning and then you got tested because when you worked in mission control, you got to run a lot of tests. They were testing the people. We had simulators that could demonstrate a live mission to you. Astronauts would be their trainings and we were hooked up, communications-wise, to control center. The computers were driving all the trajectory stimulations. We had a group the same size as the—just about the same size as the front room mission control engineers, who we call, one of the white hats. There was another set of rooms that had consoles that the guys in there were called the black hats and so they were the ones who would dream up malfunctions and problems to throw at you. So you run these missions, some of the segments of the mission, they would throw problems at you. Of course, they knew what the proponent thing was going to unfold and they would see if you did the right thing or you screwed it up. After the segment of that training was over, you know, maybe an hours' worth. Then, you stopped the simulation and then the flight controllers and mission controllers with the white hats, they started debriefing. You start at one corner of the room and the guy would say, okay. Here's what happened in simulation. This is what I did. This is what I saw. This is what I think was going on. Here's what I think the impact was and this is why I made the recommendation to do this. So it was confession time. The most important thing about confession time was two things because if you fail at these two things, you were not going to be in that room very much longer. The first thing is that—your first—the first rule of thumb is don't blow smoke. Don't try to misrepresent what happened and what you did because the black hat guys got to debrief next so it's confession time. If you screwed up, you better say it. The second rule was don't screw up all that often. Don't screw up. Don't be afraid to admit that you didn't know. So you'd go around and then you'd start on simulation. You do that again. You spent all day. Two or three days a week doing it. Well and it taught you—you would think you walk in

that room thinking you know all there is to know, but then the black hat guys would figure out a way to show you that maybe you didn't know all what you thought you thought of that anyway. So it was a very intense training. Very realistic.

DM:

Working under pressure.

JA:

Working under pressure.

DM:

And in that sense, it was kind of like astronaut training too. They put them under pressure situations so. Wow, that's a way to learn.

JA:

Yeah. Usually, the astronauts played with us and they got mouse trapped too. So that was the environment. Now, it also graduate into once we got to understand all those kind of systems and so forth, we then would study the spacecraft not from a standpoint of learning how it all operated, but we would also then start suggesting enhancements or corrections they can make to some of the pitfalls of those designs. Because it got to where the program manager on the—the fact is I graduate into the shuttle program. The program manager and the chief contractor when they had a budget reduction maneuver to make, they said, let's let these operations guys be some of our analysis system integrators and let's depend on them while we're building this stuff. That fit my background because I was not only interested in the details of how the systems work, but how they integrated together because a space craft is a very integrated design. So that—I forgot exactly where I took that branch off to that, but Chris Craft and others started talking about later in my career about the fact that looking back, it seems that the kids that came from regional colleges, the ones who came from rural environments tended to adapt much better and make such a contribution. But see, I work with people who are my kind of broad base back ground. Kind of horizontal background. Also, we could tap—we knew enough also to tap into the gurus, you know, that maybe only studied a niche. Didn't know anything else just –

DM:

Well you arrived in '64?

JA:

Sixty-four.

DM:

And by the following year, you were already on flight control? Is that—or Gemini?

JA:
Gemini.

DM:
And that was—did you say was Gemini 3?

JA:
Gemini 3. I was in the market control center in Florida. By Gemini 4, I was on the prime console in Houston.

DM:
Wow.

JA:
The first thing I did before Gemini 3, they had what they call a network stimulation because then, in those days, we had remote sites. We didn't have the technologies to remote all this stuff. They put together flight controller teams and deployed them and sent them around the world to what they called a Network Simulation 1, NS1. And I went to Hawaii, and I went to Hawaii with a Philco temperate [?] [1:21:28] guy, by the name of Jim Moser, who was along with us, and learned all about the remote sites, but by the time he got ready to fly Gemini 3, I was recommended to skip the remote site tour. Because usually happens—you still go to the remote sites for two or three missions and then you might graduate back into the main control center. For some reason, I just wound up. I never knew why.

DM:
Well was it the case—

JA:
I wound up in mission control and I was sitting there next to Army. He was on the GMC console. The guy I mentioned. The guidance console. And I was on the e-con console, there working hand in hand with him at the young age of twenty-three.

TK:
Was that when you decided teaching would wait for a while? Or when did that happen? I mean, was there a moment or was it too busy for you to think about?

JA:
Well there's another event in my life. You can imagine the cocoon I grew up in rural Texas and Oklahoma. The cocoon I grew up in and educated in school because that's all I did was study and I got—they moved me down to telephone road in Houston, Texas. Now, at that time,

telephone road, NASA was in some temporary facilities nearby and telephone road, I believe was the murder capital of the United States. That was Houston at that time. It was just amazing and so I went to work down there with another guy from in the peanut country up there, south of Weatherford, Oklahoma. We showed up together. He was rural physics student that taught me. I started in to learn about NASA and it was like—sitting around and talk to those guys—it was like they were speaking a foreign language. It was all acronyms and stuff. Boy, I just—so I went home to my wife about one night not too much later. I said, “Cheryl, I think I’ve made a mistake. I think we need to go back.” Well the other thing then happened is my father got sick and got in bad health and so I remember not long after that, I went home and looked at the situation. Boy, they were having a hard time keeping up with the stock farm and the farming. I felt really bad about it. I was heartbroken about it. I said, I told my mom and dad, you know—I sat down in my seat, “You guys are having a hard time here and I feel very bad about—” because they grew up in years by then— “I feel very bad about this.” I said, “Why don’t I move back and help you a while?” They didn’t even think. My father and mother said, “Son, don’t worry about us. We’re in the September of our life and you know that. You’ve got a family. You’re starting a family. You’ve got your whole future in front of you. Don’t do that. You keep trying to do what you’re trying to do and don’t worry about us. We’ll be okay.”

DM:

Was that when you made the decision to return, then?

JA:

So I went back. I hung in with NASA. But then it was like I caught the rope about a year later.

DM:

Okay. It clicked.

JA:

It clicked and I started understanding this thing and then it just mushroomed.

DM:

Okay. Wow. Well something must’ve worked right because like you say, for some—

JA:

I forgot to tell to tell you—

DM:

Oh, go ahead. Yeah.

JA:

I actually was talking to my wife about that and I said, we could go back. She says, “We ain’t going back. [DM Laughs] So that’s another thing I tell the young kids about maturing when I talk to them. I say, “There’s two very important decisions in your life and that is your decision about pursuing your education and keeping your life clean. The second thing though may be the most important. That is be very careful and be very strategic about who you choose as your lifetime mate. That has meant so much to my career because Cheryl, she grew up on a ranching environment as well. When we married, she was just much more mature than I was because she was raised and influenced by her grandmother and her grandfather and they instill this sense of values or what’s important in her the same way the values were injected into me.

DM:

Where is she from, by the way?

JA:

She’s from Vincent, Oklahoma.

DM:

Oh, okay.

JA:

Now, she did a timeout. I didn’t know her when I went to school in Vincent because she was in California. Her father had picked up and went to California and had an operation going in California. I think it was a filling station. But then her grandfather died and they came back. I got to break. Anybody need a potty break?

DM:

Yeah. [Pause in recording]

JA:

That setting and what an interest—kind of just follows me the rest of my life. I came here, now, just a few years ago. I got acquainted with a friend. A man and his wife, and Cheryl and his wife were very good friends and we would go on RV trips together or go camping together and after—late in the evening, by then, the four of us—the women did all the talking. You know, men don’t have a chance to talk anymore. So this gentleman that I was very close friends with, developed this close friendship with, he was a chemist. His whole focus in life was chemistry. He worked for Texaco as a chemist. As a trouble shooter. Chemistry. I found that—of course, I’m not a chemist, but I always have a lot of curiosity about chemical things and so at night, we’d have the best time. I would quiz him on chemistry related things—chemical related things. And then he made the mistake of asking me about the universe. How stars have a life cycle.

They're born and they die and all this and so he was not familiar with that process at all and so we would sit around at night and he would quiz me on physics, physical things, and I'd quiz him on chemistry.

DM:

That's great. The learning never stops.

JA:

The learning never stops.

DM:

Did you become somewhat of an astronomer? I mean an astronomer is a physicist.

JA:

Yeah, astrophysics is what they call it. I've got a great curiosity about the universe and the understanding of it is a moving target and so I try to keep up with all the latest evolvments in astrophysics in the universe.

DM:

Did this start when you were first in NASA or was this—

JA:

Yeah.

DM:

I mean, here, you're dealing with space.

JA:

Well I got curious about the universe when I was a kid. Particularly, in the summertime. You know, where I grew up didn't have any air conditioning and until late at night, it took that long for the house to cool down so what would we do? We would sit out in the yard. Wasn't any trees to speak of so you got to look at the whole universe. You could see the Milky Way, the moon, and all that. So you got to have a—you got to develop a curiosity when you're sitting out there on a chair in the middle of a dirt yard.

DM:

The presence is right there.

JA:

The presence is right there and there's no light dilution.

DM:

Exactly.

JA:

And you know, the universe is just something you can't get your mind wrapped around.

DM:

You know, that's a great advantage of living in west Texas and western Oklahoma, too. The sky is—

JA:

Yeah, absolutely. So I spent a lot of time looking at the moon when I was a kid because like I say, in the summertime, it's too hot to go in the house.

DM:

Did you ever hear any speculation about future space flight when you were a kid or think about that at all?

JA:

No. You just couldn't imagine. Even though, Buck Rogers and that kind of stuff was around, I didn't have much access to comic books. It was just something that was impossible.

DM:

Right. When you were in your early years at NASA and you were in the middle of all this that was going on, did you have any idea of the many millions of Americans—like we were boys at the time, that were watching all of this and going, "Wow?" Did you realize there was so much national interest? I mean, you being right there in the middle of it? I wonder.

JA:

Yeah. I was aware of that. I was aware of that. I was aware of the fact, very conscious of the fact that General Nixon—I mean, the President Kennedy and before him, Eisenhower—particularly, Eisenhower had formed this thing called NASA and contrary to what you would've thought happened and all these military advisors, he said, it's going to be a civilian agency. When Kennedy came along, so that meant everything we were going to do was public. So we were conscious—although, I don't think we were ever—it wasn't until later years that it started causing NASA to affect the way it made decisions. We were conscious that we were living in a fish bowl.

DM:

Right. Okay. That adds to the pressure.

JA:
Huh?

DM:
That adds to the pressure.

JA:
Oh yeah, because for the first few years of the space program, the public and NASA got to watch some spectacular failures before we got off the ground. We were mostly just blowing up stuff.

DM:
Red Stone Rocket was a problem, as I recall. Well I'd like to ask you some questions specifically about the Gemini Program and Apollo, starting out here. But before I do—

JA:
We were talking about something before the break. I forget now what we were talking about.

DM:
Well I think we came to a pretty good stopping place there, but I wanted to ask you if you've ever reflected on the fact that you grew up on what is practically frontier country. I mean, when you grew up in the Wellington area in western Oklahoma, you weren't far from the Comanche frontier, in time.

JA:
True.

DM:
I mean, you were mentioning yourself that there was a family connection a few generations before with Quanah Parker and then as a young man, you're working on space frontier. That's kind of mind boggling. I mean, the small lapse of time from western frontier to space frontier. Do you reflect on that?

JA:
Well you know, one of my favorite paintings is this painting right here and the name of this painting is, "One Man's Lifetime," and my father almost lived this. Here's a horse and buggy.

DM:
And then you had the Wright Brothers. You had up through the Rover—shuttle [?] [1:35:30].

JA:

He was born in 1894. Except for this horse and buggy, they were none of that. I mean, the Wright Brothers hadn't even come for another seventeen years.

DM:

Yeah, that was in '03.

JA:

Unfortunately, he made it to '66, but he didn't make it to '69.

DM:

But you know, at '66, there was every indication that this thing was going to happen.

JA:

It was going to happen.

DM:

Amazing.

JA:

"One Man's Lifetime," by—

DM:

Powell?

JA:

Yeah, I think that's the inscription down there. "One Man's Lifetime," by—

DM:

Rolan Powell. If you let us, we'll take a snapshot of that.

JA:

Absolutely.

DM:

That's great. That's a good graphic.

JA:

Well it's unconceivable that humans spent all that time really to just a horse and buggy and banging, within one generation of a long living person.

DM:

Your sisters were plowing with a team.

JA:

Hm?

DM:

Your sisters were plowing with a team.

JA:

Team, yes.

DM:

And their little brother was working at NASA. That's incredible.

JA:

Well yes. Well and how likely it was that a young man would grow up with that work ethic and those credentials and with that aptitude and then be a part of saving two missions to the moon.

DM:

Yeah. Moving from one frontier to another like that and then, yeah, and just adapting to this new situation and fitting in where you work it well. That's a great story. Let's talk about that a little bit. Before we get up to those Apollo. I definitely want to hear a little bit about twelve and thirteen. Which can you say something about some of the Gemini missions that you were involved in in flight control? Some of the highlights, perhaps.

JA:

To polish off that—

DM:

Sure.

JA:

What I tell people and I've told engineers and program managers and NASA people long years after that is, "Hey, technology and engineering and all that technology advancements is not what limits the country. What limits the country is the will to do it. If you can get the politics right, then the country can do anything in terms of a scientific advancement. Took me a long time to understand that, that that's really—

DM:

Is that the difference in the 1960's and the twenty-first century?

JA:

Um-hm.

DM:

Is that—

JA:

I mean, except for—I guess previous to that, the only time that you actually got the will of the country behind something was in a major war. World War II is a prime example of that. Everybody was involved in World War II. Even my parents. But it seems the country now has a hard time even getting—I mean, the saying goes, you know, now, the military goes to war and the rest of the country goes to the mall, shopping. So that's the only way that happened is that the will of the country, it was—there was a prior already to do it and so no matter how many times you failed at it, blew up stuff, you got the chance to do it over.

DM:

Yeah, and the really cool thing about this one was it was a peace time.

JA:

Peace initiative, yeah. It was. So we were living in a fishbowl having the time of our lives. So what's the likelihood that some little guy who grew up in a cotton patch?

DM:

That's incredible.

JA:

And that's the message that we need to teach all of our younger generation. You can do this, just don't get distracted.

TK:

John, there's so many of those people from rural and more general education that were part of NASA. That seems to be more of a trend, whether planned or just as it evolved. There was like a popular movie ten years ago, the Rocketeers, some kids in West Virginia. They were playing with rockets and they told the story and then a number of them went on and one of them ended up working for NASA. So from various parts of the country, we have—going to MECA or going to this project, this irresistible force drawing people forward. Was there any sense that there was something else going on within NASA as an organizational institution that was more prescribed?

This is the type that people are looking for. More creative, out of the box engineering rather than just the ones from Stanford and Harvard and that's the only ones we want. We don't want them from SWSU [Southwest State University]. We don't want them from Bethany. We don't them from any—we only want from the marquee headline schools, but they were drawing them from all these places.

JA:

Well I think the thing that happened to NASA is they needed a large work force in such a short period of time. The other thing that was good about NASA is that this thing was formed with this mission that they didn't know how to do so there was no regimented bureaucratic process to go through that had been laid out across multiple generations and corporations.

DM:

Did you have any problem with political appointees being placed in here that didn't really know?

JA:

No.

DM:

That's great.

JA:

No, that's the one—even the management system. When you got together and we sat across the table, there were no agendas. There were no upside agendas come to the table. That's not true of later NASA. The mentors that we had, the guys in charge, they were only on doing one thing and that was doing our mission and doing it right. They didn't compromise.

DM:

That's a perfect situation.

JA:

And a lot of them got branded old fogies since we went through NASA because, you know. And to some degree, I got caught up in that and that is that when the new generation of managers come up and the political appointees come so forth and they try to do something and they do it in a way, "Oh, this shouldn't cost all this much so we don't need to do all this preparation and so forth." And you say, "Now wait a minute. Wait a minute. You got to do it this way." Instead of listening to you, they have a tendency to say, "You're an old fogie. You're not a team player.

DM:

Yeah. It's people quickly discount all of that experience that you have. It's like, we've learned more in school and we're taking over now.

JA:

To the degree of the early successes of NASA, we were guilty of making it look too easy. To the neophytes. The new kids on the block.

DM:

Let's talk about some specifics of those earlier years. Like, do you think of some Gemini highlights when you were sitting on flight control where problems might've arisen? Some of the failures and successes of the Gemini program.

JA:

Well, let's see. The first experience, I thought, that caught us all off guard was on Gemini 4 and that's when the Russians had gone outside their spacecraft for the first time. The EVA [**Extravehicular Activity**], and so I was working the preparation on Gemini 4 and didn't realize there was an activity going on kind of across the campus that was trying to get far enough along that they might spring it. And so it was kind of under wraps and they decided because that Ed White that they had this group over here that built this little backpack and they're going to hook it onto a long air hose. It's not air, but oxygen. A long air hose, umbilical. We're going to open the door and send him out in this vacuum space. So that system, subsystem, fell under my per view.

DM:

Oh really? Wow.

JA:

Yeah, and so here I was. This new subsystem had shown up and this new thing had been added to the mission. Ed White was going to step outside. Well, that was a big surprise and they opened the door and he floated out and we watched him across all the continent of the United States. Listened to him. I don't think we had a camera on him. Except, they had a camera in spacecraft. Boy, now, that was a fingernail biting thing thing because how are we going to get him back in here? I mean, this big coil of rope was just everywhere. You know, was pressurized a hundred PSI. Finally, he got back in there. He got out there and got exhilarated. Got to talking so much, you couldn't talk to him because all of our communications in those days was simplex. You know, you get to talk one at a time and unless you un-keyed, we couldn't talk to him. Finally, I'll never forget, Chris Craft was one of the flight directors. You know, the big guy. Chris Craft, the flight director. I was right down in front of him on the ECOM [**Electronics Communication**] console and watched all that going on, and he was describing that. I mean, he was exhilarating.

He went—it wasn't even [?] [1:46:49] the little gun. Nitrogen propulsion system. Finally, he paused long enough after being there for about twenty minutes. He said, "Well I guess I ought to be quiet for a second and see what Houston has to say about this," and the flight director—it was one of the first times I remember. I'm pretty sure he just punched up the loop himself and talked directly to him and said, "The flight director from Houston says you need to get back in." [Laughter] and he was like, "Oh." We got him back in the spacecraft, but that experience made it look so easy that it actually turned out to be an experience that we paid the price for because it wasn't—didn't go EVA for—I guess until Gemini 9. We thought, well EVA is a piece of cake. Oh, it is not a piece of cake. So we didn't put any hand holes on the spacecraft. If you don't put hand holes, and you don't plot your way, you get out there free floating and you can't grab anything because if you—at least when you get on there, if you just touch it, moves away from you. And then you start working in this suit that's all pressurized. The first thing you know, you get overheated. So NASA had to go back to the drawing board in terms of how to maneuver, how to matriculate that environment and interact with hardware and also, how to stay cool. That's where they come up with the liquid cool garments and all that kind of stuff.

DM:

That was during Gemini.

JA:

So it was a long time. See, and then, coming off of Gemini, we went right into the Apollo program. Well the next EVA there was in a gravity environment on the surface of the moon. There was enough gravity there that you could get around. So that's Gemini 4. Now, Gemini 5 was an interesting mission in that it was the first time that the Gemini spacecraft was supposed to be powered by fuel cells, not batteries. The fuel cell technology wasn't coming along, but the time we got to Gemini 5, we thought the fuel cells were good enough to fly them and that was under my responsibility of well. And we launched that mission and I was going to work the second shift, but I stayed there for the first shift and we lost the oxygen pressure. They kept thinking it was going to stabilize. It was going to stabilize. It fed the fuel cells and sure enough, it got down to like seventy PSI [**Pounds per Square Inch**]. We didn't know the fuel cells were going to work or not. At that time, we were off the range. What to do? Do we land now? In a contingent landing area? Or do we try to make it back to the primary landing area? About that time, it was shift change. And so as the new flight director came in, I had done some work on power profiles, in terms of what's the minimum amount of power you need? And I just happened to have it with me. I saw myself standing there in front of the two flight directors explaining to them that if we powered this thing down to this level, then we can make it back to the landing area. This primary in case, these fuel cells quit. I did not realize, at that point, the kind of impression I made on the flight directors there, because then what happened Craft got up and went on shift and Gene Kranz came on and he did something that I wasn't expecting. He says, "Okay ECOM." He said, "Let's see what this thing will do." So I started powering it down,

powering it down, powering it down. So then, he finally says, “ECOM, let’s start powering this thing up a little bit. You know, let’s see what it’ll do”. And I couldn’t figure out why? What he was doing. I mean, we were stabilized. We were going to make it back to the landing area and I fully expected when the morning come—the sun come up the next morning, we’d probably landing off the coast of Florida somewhere. But no, by the time we got back to the next morning, I had the space craft kind of intermittently powered up enough that you could tell that it was going to hang in there. Well, I didn’t even think about it. It wasn’t until later—many, many years later—just recently, that they have talked about the significance of that and that’s kind of true of my career. There’s a lot of things that I maybe affected and maybe fed into a decision that made a difference. It wasn’t about patting somebody on the back. It was just—it was an environment where you were expected to be there with a right answer and then, by the time it was all over, it was time to go on the next mission. It was only in the latter part, within the last twenty years, have the stories come out about the significance of some of things that we did.

DM:

But apparently, you were gaining their confidence. Gene Kranz, for example, in thirteen. Then you veto power over—

JA:

And Craft, and yeah.

DM:

We’ll talk about that here in a minute.

JA:

See, but all that time, I was just trying—you know, I was trying to do the right—be there with the right information at the right time to make a decision. I never thought much about it. I just continued to live in fear that I was going to fail. It’s like, I could’ve screwed up the next one and it would’ve been—I would’ve been thought of as, well that’s good, what are you doing for us lately? I didn’t catch the significance of things. There was a story about *Apollo 13*. It was in 1992. Or maybe ’91, ’92. I was working a completely different job up on—in a different area. The phone rang. And I picked up the phone and the voice said, “Are you John Aaron.” I said, “Yes.”, “I understand you worked on *Apollo 13*.” I said, “Yeah, I did.” He said, “Well we’ve been having a hard time finding somebody who work for *Apollo 13*.” But he said, “Some of the personnel office gave us your name.” I said, “Okay. What can I do for you?”, “Well we want to talk to you.” I said, well—I was in the middle of meetings—and I said, “Go ahead. I got ten minutes.” They said, “No. We want to come down and talk to you.” I said, “Oh.”, “In fact, we want to come down and bring a camera crew and film it.” I said, “Oh?” I said, “Hm. What are you doing? Are you doing some kind of 20/20 piece?” You know, the TV program 20/20? They said, “No. We’re going to do an hour and a half documentary on *Apollo 13*.” I said, “You what?”

I said, "Let me mention something to you guys. *Apollo 13* happened twenty-five years ago. Even though it was a four day thriller while it was going on, when we hit the water, nobody's talked about that mission since." And that's true, it was. I said, "I don't think there's a story there." That's kind of the mindset you get into. You get into this and it was just kind of another day's work.

DM:

Wow, but the impact is not obvious.

JA:

The impact is not known for years.

DM:

Yeah. Wow.

JA:

They said, "Well I got to disagree with you. We think there's a story there." I said, "Well come on down. We'll make some time and do it." Well that was the documentary that public television did called, "To the Edge and Back." One of the first documentaries. It's like the thing has been sitting there for twenty-five years, something happened, and the stories just catch legs. That story, it still has legs. I can't explain it.

DM:

And it's a fascinating story.

JA:

It's a fascinating story. So I'm not a good judge of—

DM:

Yeah, because you were right there.

JA:

Right there. I'm not a good judge of what my contribution was at the time. I just focused on what a close call it was. It was a miracle I got home.

DM:

Let's talk about it a little bit. Maybe you can give us some specifics on—I know you were involved in the rationing of power and the power up sequence. Can you give the details on that? Where you were when you got the call?

JA:

You know, yeah. I remember it very vividly. I was home shaving. The phone rang. Arnie Alders called me. I was, you know, shaving. He said, "John." Because one of my expertise's was the telemetry system. I had memorized all the circuits. He said, "John, there is something happened out here. It's some kind of problem that they can't figure out. But they're chasing it like it's a telemetry problem. It's a bunch of false readings. None of the readings make any sense to them." And I said, "Telemetry problem. Okay, well Arnie, walk around behind the console controllers and look at some of their displays or read me out some grammar." I said, because perimeters—if the telemetry system had failures, it was a basket full of single point failures [?] [1:58:03]. There's lots of little circuits that could fail that would give you measurements in either groups of three or groups of five that go haywire. So I said, "Read out these two perimeters for me." He did. "Then read out these three perimeters for me." He did that in about three or four minutes. I said, "Arnie, that is not a telemetry failure. You tell those guys that I don't know what the problem is, but tell them it's not a telemetry failure. That's a real failure. It's a real failure. I'll be right there." So I walk—I drove in. Walked into the control room and I didn't immediately put on a headset. I just kind of walking behind each of the console controllers and listening to what they were chasing. At that point, I walked up to the ECOM console, which is where I, was my primary console. Sy Libergot was on the console and he was still chasing that problem and they were running out of power. The voltage had gotten so low that they turned on one of the emergency entry batteries and they were draining the battery, trying to troubleshoot this problem and I said, "Sy, you're not going to fix this problem. You're not going to fix this problem because you need to turn the command module off. Turn it off. You got a reentry battery that's a small battery that's used just for reentry. You're draining it and I don't know whether we're ever going to get back in the vicinity of the earth to reenter, but if we do, we're going to need that battery. We're going to need all the battery power we got. Need to turn it off."

DM:

There must've been some reaction against that. Was there?

JA:

Oh, it was like, wow.

DM:

Say what?

TK:

But you could see down range already?

JA:

Oh yeah, I was already down wind. I was already down wind. And so no, he resisted it. He had

never been turned off the flight. Nobody knew how to turn it back on. In the means that you would have to do it in real time with limited power so that was a fundamental shock that Cy—because he was on the console prime and was going to have to just give up and turn it off. Well it took a while to get that in effect. So but within not too long, the decision was okay. We got to get in the wind and we got to start powering this thing down. So I was there helping them in real time, just inventing the sequence of how to power down. There was no written procedure about how to do it. I got down to the last step because we had to be able to if we were going to [sneezes]—the last thing that was precious to save was the alignment of the inertial guidance system. And so the tool guidance systems and the two spacecraft were identical, but they were—they faced each other and so we had to read out the position of one and then invert the thing to put it in the other. But after that happened, it came down—I'll never forget. The last thing I saw of the command module was when it came down to killing the thermal control system on the inertial guidance system. Gary Cohen was the guidance controller right there next to me and so I called for that circuit breaker to be pulled. Gary says, oh—he tapped me on the shoulder, “John, John, John, John. Don't do that. You can't do that. Don't do that.” He said, you know—I said, “Gary, we've got to do it. We've got to pull out the heater.” The heater circuit was the last one and I said, “Gary, we've got to do it.” He said, “John, don't do that. It's only a half an amp of current. And if you pull that guidance system may never work again.” I said, “Gary, it's a half an amp. We're probably a hundred hours from home. That's fifty amp hours. That's bigger than one of my batteries, my pressure batteries.” He said, “Okay.” We pulled the breaker. Well then, what the command module did—and then the focus then started with wrestling with the lunar module, who wasn't designed to do this thing. I left the front room and we all assembled in the back room. I was sitting there with a guy named Jim Kelly. This conversation kind of turned into commiserating about what happened and how impossible. This thing, we didn't know you can't get them back and so forth. I started down that path of thinking and I said, no. I've got to quit thinking like that. So I started my thought process. I stopped myself and said, forget about it may be impossible. What would it take to make it possible. Went through the gymnastics, mentally, about how much power we had. What I knew about how to power a spacecraft. I said, we've got to design a sequence that will make it work. So about that time—but I didn't have an answer at that point and Gene Kranz came in the room. Of course, everybody—you may have heard some of this story. May have saw the film. Gene Kranz came in the room and we were kind of sitting around the table back there with the rest of the controllers. Well, the command module and kind of commiserate him. He came in. I guess he sensed that it's time for a pep talk. And he came in. I think he summed up the situation that we were kind of down in the mouth about it and hanging our heads down. He said, “Okay guys. Okay guys. We've got them in the limb now. Got the limb powered up. Got the alignment transferred and guys are working on a trajectory change that'll put us back on a free return. We're going to get back on a free return and we're going to come back to the earth's power man module and land.” I can't believe this. I just raised my hand and said, “Gene.” Gene Kranz. “Gene, you can't do that.” He said, “Stop! What do you mean we can't do that?” I said, “Gene, you don't have the power to do that.” He probably made the

decision and he made it in an instant and it was the thing that allowed this whole thing to get converged. Without even thinking about it, he said, okay ECOM. You've got the power system. Anybody that needs any power is going to get it from John Aaron. Well that declaration gave me the wherewithal, because if you just throw it into a committee, they could've worked on that for a month and not figured out how to do that because nobody—it was—you know, when you engineer something, even a procedure, you have to engineer it around a constraint and constraints are good. You know, engineers sometimes think constraints are bad. Constraints are good because it causes focus. So he said, "Okay ECOM, what do you think?" I said, "Well I got some ideas." I got up to the white board and I started sketching out a profile. Noise started in the room. "Oh, you can't do that, ECOM. I've got to have this and this and this to do this around here." I finally stopped because I didn't have all the answers they wanted. I said, "Hey guys." I think they appreciated that. "Hey guys, stop. You guys all get a cup of coffee. Come back here in forty-five minutes and I'll have you a better plan," and they did. So that started a three day convergence process that went from block diagram concepts, block power proof all concepts, to right down to every switch and circuit breaker in the spacecraft. The thing that I came up with to make the most effective, efficient use of power, is I said, "What if we powered up the spacecraft backwards?" What I mean with that is that normally, when you go out to launch a vehicle two or three days before you fly, you start out and you start turning on the support systems. You turn on the telemetry system. You turn on the communication systems. You turn on heaters and all that. And then you get back down to finally doing the final line of the gliding system and all that. So I came up with this sequence where we first sent Jack Swagger down into the command module flashlight. No telemetry, no comm. And to do this procedure that was going to power up the guiding system and get it all aligned and then about an hour before reentry, we turn the comm system on. The telemetry system. And see how it came out. I got to hand it to Jack. He went down with a flashlight. Started powering the spacecraft and when he turned the telemetry system off, he'd done it perfect. You know, it's just interesting what happens when you look at something sometimes and it's impossible, you just quit thinking about that and start thinking about what would it take to make it possible.

DM:

You had to break the mold in a sense, and turn it on its on head.

JA:

Had to break the mold.

DM:

Yeah. And under pressure. Intense pressure, I think.

JA:

Yeah. There were a lot of things like that on that flight. I mean, I don't want to—you know, there

were ADHOC teams doing things to save that mission that were analogous to what I was doing in their own right.

DM:

You were given a lot of authority, though. You were still a young guy.

JA:

See, that's the secret. I'm glad you mentioned that. This training environment that we did. You know, our managers and mentors used the training by observing us and training how to react to build confidence that when the real stuff hit the fan, we had a good chance of working it. That was just not my console. That was all the way up to the flight director. You had to build a confidence.

DM:

Well you had done that with *Apollo 12*, probably.

JA:

Yeah, *Apollo 12*.

DM:

I wonder if that was one of the reasons they said, okay, take it.

JA:

It is. Yeah. And they did it. They didn't have them stop and have a meeting.

DM:

Right. No time for a meeting.

JA:

No time for a meeting.

DM:

There was another southwest Oklahoma guy working on that problem. Was on a different part of the problem, maybe the carbon dioxide problem or do you recall anything? Another classmate? I might have the name here. Let's see if—Weichel? Tommy Weichel? Do you remember that name?

JA:

Who?

DM:

Tommy Weichel. I don't know where I come up with this. Some interview.

JA:

I didn't catch the last name. How is it kind of spelled?

DM:

W-e-i-

JA:

Oh, Weichel. Tom Weichel.

DM:

Was he working part of the *Apollo 12* problem as well?

JA:

Yeah.

DM:

That's kind of interesting. We've been talking about the—

JA:

Tom Weichel. Yeah. See, there were things that helped the power problem be successful. The biggest thing that happened is—and again, this was a gutsy decision that wasn't made by me, but they had the collective wisdom of the guys doing it. Is that—in fact, Jerry Bostick, down the street here, was working the trajectories. He and Tom Weichel were working the trajectories to get it possible. See, when it first happened and we got back on the free return trajectory, we were not headed to the Pacific. We were headed to the Indian Ocean. Not many recovery forces out there. They came up with the idea that as we go around behind the moon, we'll speed this thing up and if we can pull off this major maneuver, we can speed it up enough that we can take a day off of the mission and rotate the landing back to the Pacific. Well that did two things. One, it got them next to good recovery forces. The way it helped me, it took a day off of the high profile.

DM:

Exactly, yeah.

JA:

They're just—Tom Weichel worked in the trajectory area.

DM:

Had you known him at Southwestern, by the way?

JA:

Yeah, he's the guy. You asked—I think I told you I walked into NASA with another guy from Southwestern. That was Tom Weichel.

DM:

I'll be.

JA:

We walked down—and we didn't—of course, he and I didn't have but one suit and it was a black suit. We walked in there with suit and tie at this off white, offside facility off a telephone road and they had so many NASA people in there that the air conditioning system was broken. It must've been a hundred and ten with a 100 percent humidity. Everybody had their coats off, their shirts open. We walked up to this guy we were supposed to report. A guy named Mel Brooks and he said, "Who are you guys?" And we told him that we're the new recruits who were reported to visit. He took one look at us and he says, "Well you could've fooled me. Looks like a couple of IBM salesman to me." [Laughter] That was our introduction to NASA. I said Tom Weichel can tell you about this. Jerry Bostick down the street was working the flight down in Wisconsin. He was ____ [2:14:38] just in front of me. He worked *Apollo 13*. He can tell you some of the other, the trajectory aspects of that, so it's about training and it's about having your supervisor and the super structure confident because they're going to put you in charge. The flight director had the authority of the agency. Whatever he decided was what happened and that's kind of unprecedented.

DM:

Did everything work in the procedure that you put together? Obviously, it worked. But were there any glitches along the way?

JA:

Any glitches? Yeah, there was one thing that when he turned on the spacecraft, the power level, when it was turned on to Telemetry, the power level was slightly higher than we had calculated. We said, Where the hell did that come from? What is that? How long has that been on? Because you know, in a battery, it's not just the amps. It's how many times, amp hours. Amps times hours. You know, it decrements what's left in the battery. We quickly sorted out something with the help of a Rockwell [?] [2:16:11] guy that we didn't know about the spacecraft. When it was assembled, it was mis-wired. Instead of a certain function being on this other circuit breaker, they had wired it to this circuit breaker with this other thing that we had turned on. We found a wiring error in the spacecraft right there in real time. But that particular circuit breaker that had

been wired to hadn't been on very long because the first thing I told him, the back groom guy says, "Goodness gracious. What is that? Where did that extra power come from? How long has that been on? There goes half our margin." The other thing that happened in the whole thing was when we first drew up the sequence, we could only have enough power to do what's called an open loop reentry. It depended on just time and a G meter. That is the—and nobody—the trajectory guys and the guidance guys, they didn't have much confidence in that backup technique. I mean, we had a situation where the primary guidance system was a super solid solution. The backup to that was a really degraded solution. And so then one of the first fights we got into negotiating this power was we got to have the inertial guiding system up. I said, "No. We don't have enough power for that." But when they moved the mission up a day, then we, by then had started and made another decision. One of our module guys, then, didn't need their batteries for another day. So they then let us have some power to recharge the battery that had been discharged originally. So we got to get those batteries charged back up. That allowed me to get this thing back to where we had inertial guided reentry. That was the gold standard for entry because it has the capability. Inertial guidance reentry has the—rather than just executing a step by step procedure based on time, it has the capability to measure what the atmosphere is doing to you and feed that back into the solution about how to maneuver the space craft to keep it captured. So here we go. We got down. It was time then to just eject the service module. It took special procedure to do that because never had done it that way. And it didn't have a way to back away from us. So we invented this procedure to have—it was separate spacecraft push the service module by foot per second and then we'll separate it and then we'll pull a foot per second and maybe that won't affect the trajectory. We still stay on the trajectory. Got rid of the service module. Then it came time, we got to—the crew—all three in the command module and shut the hatch. Now, it was time to get rid of the decent module on the whim. On both the service module and the decent module, the problem you got into was that you're headed for the atmosphere. You don't want to separate those objects in plane with you. You want to get them on different tracking. You don't want them in the same plane you're running. So what you have to do? Well you have to yawl at a plane to do that. The inertial guiding system had one limitation. It didn't like to yawl at a plane. The gimbals on the inertial guiding system were such that you could them into a thing called gimbal lock. In that case, if you maneuvered, you'd drag the alignment with you. So the way we had set up this procedure was that we were going to thin the yawl out of plane again and then eject the decent module. But we were worried about gimbal locking. So what happened was when the crew started making that maneuver it was manual and I found out later, the crew went the wrong way. Instead of going this way, they went this way. Boy, they give them a warning, was facing us. I thought—I was sitting there, couldn't do anything other than the guidance officer saying, "A flight, A flight watch out, it's close to gimbal lock." You know, I had worked for three days on how to get this thing to be an inertia guided entry. Here I am, just a few minutes before hitting the atmosphere and we're getting ready to dump this platform. The inertial guidance system. But it didn't happen. So we had the thing all zipped up and the next thing is we were sitting there waiting for entry interface and it was a period of time

and then what do you do? There's nothing to talk about. You're just quiet. Just a little crackling on the radios every now and then. Finally, I think it was this mission that—maybe Joe Kurson [?] [2:22:25] was the CapCom, Capsule communicator, and I'll never forget this because he's a very calm, kind of—he's a doctor type. Not a doctor type. He is a doctor. Medical doctor. One of the crew said, "Thanks, Joe. You know, Joe, did anybody ever tell you you have a very calming bedside manner?" Got into that little conversation. [DM Laughs] Then they hit the atmosphere and then they didn't reappear on time. Then you start sitting there second guessing—you sit there second guessing what went wrong? What went wrong? What went wrong? Is this it? Then the next thing you see [claps] the voice control—voice circuit came alive and within a few seconds, we had real time TV on one of the projectors, and you could see those three shoots. The shoots unveil.

DM:
[sighs] What a moment.

JA:
Well, euphoria broke out in that room. So *Apollo 13*, I think I made two—I mean, a lot of people made a lot of contributions, like they going on about that. But I think I made two that had impact. Made a contribution impact. I think it was instrumental to get the spacecraft powered down to save the power and get it powered down a right sequence. The second contribution was conceptually coming up with how to power it up and then leading the teams' effort to turn that into circuit breakers and switches and timelines.

DM:
Some people say that getting those guys back was as big an accomplishment as NASA ever made.

JA:
Oh, yeah.

DM:
Including the moon landing because it was that kind of complexity under pressure. Do you agree with that?

JA:
In particular, was a significant event, except for ground control. It was the reason that we existed. I used to—I sorted it out very quick and I used to see my peers work and train missions and so forth and I tried to instill upon them the following principle about why we were there. Why we were at the console. Why was that data being all fed back to us? Because the crew—crew were very adapt and very sharp people and they trained, trained and trained very hard. So

most emergencies, there's enough procedures that had been canned and put in place that they can usually handle the first little failure, the first little reactions. I kept trying to tell the guys I was training, don't get wrapped up in that. That's not why you're there. I said, you're there when—you're training objective is to be adapt, smart enough, and versed enough with the right background so that when the unexpected happen and nobody knows what to do, you have the answer. Don't get hung up on that other. Therefore, you need to—what I was really trying to tell them—you need to study hard. You need to train hard. You need to do “what if” thinking. See, this is all about “what if” thinking, you know? You sit around on a spacecraft design and say, what if that happened? What if that broke? I wonder how that would react? And then you go pursue that. You core drill that to the point of understanding so that you got a feel for it. Your job is to be there with the right thing to do when the unexpected happens.

DM:

That's what saved *Apollo 13*.

JA:

That's what I'm saying. That's what *Apollo 12* was about.

DM:

Let's talk about *Apollo 12* a bit, if you don't mind.

JA:

Now, that is an interesting one and to some degree, it's—I think Sy Libergot got up into the wrong expectation. You know, in one second, everything could look like it's all going to hell and if you just find the magic switch, it'll fix it. I think he was looking for the magic switch. It wasn't there. What happened on *Apollo 12*, I think was a direct outcome of something I had witnessed on *Apollo 7*.

DM:

That's when you were in the simulator. It was the simulator—

JA:

It wasn't a simulator. It was a live test. We were over there. I was over there and the flight controllers had spent all day trying to countdown, do a live a countdown, of the spacecraft and the booster sitting on the pad to try to do what they call a mission sequence test. It wasn't so much assimilation as it was a mission sequence test. You were doing it with real hardware. It was late. They had all kind of trouble talking to each other. The blackouts couldn't talk to the capsule and it was a long day. Well I was—I came on shift late that afternoon and sat there and they were doing this—they were all doing the orbits phase sequence and then they got ready to do the reentry sequence and by that time, the real astronauts had got out. They were tired. They

got out of the spacecraft and they put the sim crew in and they were the guys—test engineers, who would get in the spacecraft and be the astronauts. Well and so they didn't do the sequence off of paper. The test conductor read the sequence to them. He would say, "Okay. TDR, do this. Do this. Do this. Look at this." You know, it was a very slow, methodical process and then they got to the point of actually setting up reentry and what that meant was that you have the entry batteries on, but the whole space craft is powered up. So you're floating the—you're making up the rest of the power to keep the batteries happy with external power. So they had—they got themselves in a screwed up sequence and they had one battery on and then they dropped the external power on the spacecraft. Well that dropped the whole spacecraft on one battery and did it groan. I mean, it groaned. Meanwhile, all my lights went crazy and the readings all came up funny and that—I couldn't figure out what was going on and so they couldn't figure out—at Florida—they couldn't figure out what was going on either. And then so it finally got to where I knew that they had the whole spacecraft powered on one battery and that was not good. That wasn't going to last long and so normally, in a test like that, Florida's totally in charge. You don't—you have to be careful calling them and say, "Hey. Wait a minute, guys," because they take pride in knowing what they're doing. So I watched that for minutes and I then I walked up. Glen Lang was on the flight director console. I said, "Glen, those guys have got themselves all screwed up down there," and I said, "They're not trying to save the spacecraft. They're trying to go back through the paperwork to figure out how it got all screwed up. They got the whole thing on one battery. I'm getting worried about that battery. It's going to do a meltdown." Glen said, "Well I hate to get on a loop and interrupt them," but then he came up with the idea, I'll just call them on the black phone. The black phone was the landline. So he picked up the regular phone and called the regular phone in the blockhouse and explained to them that ECOM was a little concerned about what's going on up here and he suggests that while you're trying to sort that thing out, turn the ground power supply back on to save the spacecraft and that battery. The next thing I know it happened. Well, I carefully preserved all the readouts and all the hard copies from what had been displayed to me.

DM:

Was it making distinct patterns?

JA:

It was. Well it just kind of froze in a pattern.

DM:

Okay.

JA:

And I didn't even recognize that at the time, in real time, but I had data and I could recreate what those displays looked like. I drove home later that night thinking about it. Next morning, first

thing when I got back in the office, I sat down thinking a guy was more of an expert than I was on the telemetry system and we reconstructed what happened. We looked at electronics. Figured out why it did what it did. Didn't ever really understand for sure why it produced the exact pattern that it did, but it was truly a distinctive pattern of numbers. It was like a pattern of fifteen or sixteen different numbers, mostly associated with power system. And I—so I didn't think—you know, it's like, okay. I now understand. But what's amazing about that is I didn't write it down. I just memorized it. Didn't write it down. Didn't even tell the other ECOM. Now, that was irresponsible on my part because—that I didn't share that with them—because the way the simulator worked when we were doing the simulations back in Houston, if the power—if that SCE [**Signal Conditioning Equipment**] failed, all the readings went to zero. No, that's not what they go to. They go—

DM:
Right.

JA:
--To this funny looking pattern.

DM:
Right, right. But that was implanted in your mind because this was a year before *Apollo 12*, right?

JA:
Yeah, implanted in my mind. A year before. That would've been—well, we flew *Apollo 7* in October of '68.

DM:
Yeah, and it was in November.

JA:
That pad test was probably in say, September '68, and then *Apollo 12* flew in—

DM:
November of '69.

JA:
Sixty-nine

DM:
Yeah. Fourteen months.

JA:

So when that hit, when that lightning strike hit—because I didn't know it was lightning. Nobody in Houston knew it was lightning.

DM:

Oh yeah.

JA:

Nobody knew what happened. It's just that all the sudden, the console just lit up like a Christmas tree and then that Pete Conrad came online and started talking about all the lights are on the spacecraft. There it was. There on my primary screen was this pattern. I said, "Okay." I made a quick call in my back room. Jim Kelly was in my back room. I said, "Jim, looks like the SCE. I think we ought to go SCE to AUX [Auxiliary]." And before he could actually even answer, I told flight ECOM, "Try SCE to AUX." Now, Jerry Griffin was on the console as the flight director. He was listening to all of what was happening and the first guy to talk to him was me. He told me later, he said, ECOM, I really didn't want to answer you because I thought you were just probably going to tell me to abort. But he said there was such a matter of factness in your voice, that I just blindly did it. So he passed it to the CapCom. CapCom, tell him to go SCE to AUX. Of course, CapCom said, what's that? Griffin said, "SCE to AUX." He said it up to the crew and Pete Conrad said, "What?" Now, because it was—so it was like—I told Jerry Griffin later, I said, "No, no. Jerry, aborting was never on my mind." But I think the fact that I just said it like that and the fact that I was calm.

DM:

Yeah, matter of fact.

JA:

Matter of fact. It wasn't—I don't think he sensed I was grabbing at a straw.

DM:

Yeah.

JA:

Now, the thing about this story is it gets told lots of ways. They think—the story goes the way people tell it is SCE to AUX fixed the problem. No, it didn't fix the problem. SCE to AUX got me some real data back and as soon as we got the real data back, the next thing I realized, just like I had seen on Apollo 7, they had lost the power from the service module. I mean, from the fuel cells. Well if you think about it, that's just like turning the ground power supply off. We were running on the batteries and they turned the whole generated power off. Dropped the whole spacecraft on these three batteries. They even went brown out. So the real thing that solved the

problem was to get the three fuel cells turned back on. It wasn't the SCE to AUX fixed it, it gave me the visibility to figure out what happened and it was that all three fuel cells had tripped off the line.

DM:

Yeah. I think the amazing thing to me is that you've seen a lot of telemetry information and one pattern that you saw fourteen months before and it pops up again and you recognized it immediately, and this was a time sensitive situation.

JA:

Yeah. I've thought about that a lot. In terms of suppose I wasn't the ECOM on the console. Suppose I didn't remember that. Suppose that mission had resulted in an abort. I think that would've been the end of the program, full stop. I didn't think it then, but we'd already landed on the moon. It was probably—a lot of people knew how dangerous those missions were. They've said, well we've accomplished the president's goal, let's go do something else.

DM:

So if *Apollo 12* had aborted, and then especially, if *Apollo 13* had followed, there would not have been an Apollo, another—a continuing Apollo program, you think?

JA:

No. I didn't realize at the time, but the way the politics works, I have a much better appreciation for them. I watched the Challenger reaction.

DM:

Right. By the way—

JA:

Well you know, I think back on the whole Apollo program. I mean, it just seems like a lot of that was meant to be. You know, we were hanging out in so many ways in so many places. Like if *Apollo 13* problem had happened in lunar orbit, they'd still be there.

DM:

So many close calls.

JA:

So many close calls.

DM:

Did you ever sit down afterward with Conrad, and Bean and that bunch and talk about what had happened?

JA:

No, you'd think we did, but I didn't do that with any of the crews. What happens is as soon as they fly, then they're off on world tours. You don't ever get a chance to be around them much anymore. You go to the next bunch.

DM:

Yeah. How about the way this was all portrayed? You know, especially *Apollo 13*. You know, a big movie came out with Ron Howard, Blazer movie. I think, Bryan Blazer, I think his name is. Grazer. That *Apollo 13* movie and then from the earth to the moon, the series. You're portrayed in those. And did they talk to you? Did they get the real scoop on this? Did they portray it correctly?

JA:

Well yes and no. There's an interesting story about this and Jerry Bostick can tell you about it. It so happened that Jerry Bostick's son didn't pursue the engineering side of the world. He grew up and became—started—he worked for Ron Howard, producing movies. Jerry Bostick's son, Michael Bostick. Well he kept trying to convince—he kept working with Ron Howard making movies and he kept trying to tug Ron Howard and telling him, look *Apollo 13*. “You need to make a movie about *Apollo 13*.” Ron Howard, he described it a little bit to Ron Howard, kind of as the story goes. Ron Howard would say, “Okay, okay, okay. Well we got this other thing. We got going about this other thing.” And so finally, the story goes, according to Jerry Bostick, Michael Bostick convinced him. Said, “Look, I know you say we don't have time to work on a movie, but he says, I want to do this just to get you acquainted with it. Let's all get on an airplane and go to Houston and I want you to talk to some of those guys,” and sure enough. Well by then, I was working on space station night and day. It seems like I always night and day on anything I work on. But anyway, I was working on space stations because it was having a very difficult time and I was always—my secretary would always print up my daily schedule on a card. A three by five card. I just followed that card. I always seeing something on my card interweaved in the days about go to the control center and support a discussion with some dignitary that's floating through. They always wanted to go tour the control center and then float through, and so I'd go over there and do the glad hand thing. So there was one appeared on my schedule back in those days about, it was like four in the afternoon and it was go to the control center and talk to this group of people. As usual, my schedule by that time of day was running late so I got over there, but it was ten minutes late. So I walked into the control center, the lights were all dim and sure enough, there was a group of people there. A couple of NASA guys there. Just two or three or four people group. I walked up and at the same time that a question came up in my area of

expertise and my NASA guy just kind of turned to me and I started answering this question. As I was answering this question, I started looking at who was it I was talking to and there was stood Tom Hanks and Ron Howard. I thought—[laughter]. Well that then evolved into an after work discussion at a local watering hole where we all sat down and had Cajun food together. In fact, from that discussion, is where the term, 'failure's not an option,' originated. That's attributed to Jerry Bostick. He's the one who sprung that term up. I'll let you—I'll let him tell you that story. So Ron Howard, then, reordered his priorities and started working on the movie and by that time, Jerry Bostick had retired and so he hired Jerry Bostick to come be the consultant. Jerry Griffin, the flight director, I think was also hired. I was still working at NASA and didn't even get involved with that. Of course, those two guys, they knew the environment. They knew the setting. They probably didn't even need me. So Jerry tells this interesting story about when Ron Howard got all of this cast named. He tells this story about Ron Howard coming to him and saying, "Now, I got this cast name and he said one of the things we do is we get somebody in to talk to them for a few minutes about the environment, the setting, of that thing." He said, "Now don't get discouraged because when you talk to those guys, they may not be very interested in what you have to say and might not be paying any attention to you," because their ego, right. Well as the story goes, Jerry got up and started talking. He talked the rest of the day. Continued the next morning. Tom Hanks, out of that experience, became a real space cadet. I don't know how else to describe it. He started producing stuff himself. So when you see that movie, although the sequence they had to shorten and all that, they captured the environment of the room. Did it very well.

DM:

Wow. That's great. How about your part? The guy who portrayed you in both of these?

JA:

That one's kind of interesting. The way they portrayed how the entry sequence was done was hokey. But I understood why. It goes back to when Ron Howard stood up in the theater in Pasadena for the premiere, he looked out over the audience and it was just full of NASA engineers. He said, "Now guys, we know that all of you have made a major contribution to this, but we had to make some composite characters and we had to do these shortcuts and these shortcuts. My only excuse to you is that you're the reason. You had three days to get them home. We only have two hours for this movie." [Laughter] So what they did, the thing about the entry power sequence, they pictured me sitting next to a meter that was outside the simulator that was reading how much power the crew was using and I was adjusting it real time there. I say, "Now people, that's not how that happened." The digital simulator did not portray the consumption of individual components well enough that you can bet your boots on that. But I said, the real sequence from a power standpoint was worked out with pencil and paper and slide rules. When it came to simulating the power of the general spacecraft, the simulation computers were limited in those days, the trajectory guys got all the computation cycles. The systems guys, there weren't

many left over for us so we had to do slide rules on pencil and paper. But I thought they captured it. That was the best recreation of a space mission that has been done before or since. Most space movies, none of us ever went to them because they were all hokey. So hokey.

DM:

Right, but they did their homework. They talked to some of the people. Glad to hear it.

JA:

Jerry gave me an example about Ron Howard got concerned about how could he make sure they look realistic how cold the spacecraft got. So he put together a movie set with enough air conditioning that they cooled the whole set down to where that when they breath their breath would freeze, would fog.

DM:

They really did put some work into it then. That's good. Wow.

JA:

I don't want to tell too much of this story because I don't want to tell other people's thunder, but that was a good movie. It perpetuates the fact that this thing has legs. There's something about this experience and of course, this is all new to me and I didn't realize it until I got away from it. I started observing how this story, once it got reactivated after being buried for twenty-five years. She just keeps having legs. After I retired, and it still happens today, I would run into maybe once a month, once every two months—of course, I get requests for all kind of autographs and all kinds of stuff. But the most significant thing is once in a while, the phone will still ring, and I'll pick up the phone and it'll be somebody who wants to talk to me. Some—I mean, John ____ [2:49:59]. You know, after a while, after a certain number of people did that from all walks of life, I picked up a trend of why is that? Why are people picking the phone up and calling me? Just a cold call. First of all, they're surprised I pick up the phone. But then they will start talking to me and the message mostly has to do with not only thanking me for the contribution of what it meant, but what they really wanted to talk about, or talk about, is what they were doing when it happened and what it meant to them. But they do it in a way that I picked up this trend and explanation for why they do it. In the sixties, when we were doing that, the space program was happening and it was real and it was about a country that was all tightly wound together. Everybody was on—except for one thing I'll mention—we were all in this together, supporting this thing. I think what they miss today, what they're yearning for, what they're searching for, without really telling me, is they now find themselves in a situation where maybe they're my age or younger. A little older. They don't feel like they can get ahold of something that's real again. Because it's not that they want to know a lot of stuff from me. They just want to tell me what they were doing.

DM:

They want to connect.

JA:

They want to connect with what—

DM:

That's something I think is unfortunate with people younger than us who didn't live during this era. They can hear about this, but they can't feel what that was like at that time. But yeah, they're talking—they're feeling it so they want to connect with you.

JA:

They want to connect. They want it back. They want the country back that they had when it happened.

DM:

Now, it's become a classic American moment. It's—yeah. That's kind of the way history works sometimes. Things lay dormant for a few decades, maybe a century, and then all of a sudden, it's wow.

JA:

We appreciate it later. Now, you know, that then sparks—begs the question—how can we get that going again? How could we be of one mind again? Now, we weren't totally in one mind in the sixties. While we were in the cocoon of doing these grand and glorious explorations of space and the moon, there was whole other factions tearing the country apart. That, the Vietnam War. And that forever changed the country. It's the thing that took the New Deal coalition of Roosevelt's, took that apart. Took Lyndon Johnson apart.

DM:

What do you think? Is this going to come back around? This kind of national effort that will support maybe a Mars initiative? You worked on that later on, as I recall.

JA:

Well I don't know. We talked about the biggest example of this was World War II, when the country just rose up, defeated, made it successful at all costs. The moon program was the first example of that, from like civilian program. Maybe the transcontinental railroad. I don't know. But if you think about what happened and why did we act? It was a threat. It wasn't that it was just a threat. It was a threat that everybody, man, woman, and child, identified with. World War II. I mean, Sputnik. I don't know how old you are, but were you alive when sputnik was lost?

DM:

I was born that year.

TK:

I remember they were talking about sputnik. A couple years older than David. I hate to admit it. He's still a young man. But I do remember the concern and then when I entered college, that afterglow was still. Well you went to college at a time where that they were very concerned. The gap. The brain gap. The math gap. The physics gap. Every.

JA:

The brain gap. Yeah, when I was in high school and the first few years of college, the issue was hey, what happened? Why has America lost its technical Prowess? We're behind This enemy is bearing down our throat. See, I remember in school, being trained to duck and cover.

DM:

Yeah. I remember that.

JA:

My parents were old enough that they were very tied into the Cold War. And you know, I went to bed a lot of nights as a kid wondering if we were going to be alive in the morning.

DM:

Right. I remember that real threat, as well, as a very young child. I was in Fort Worth, where it was a target. You know, a prime target. Right during the Cuban missile crisis. We thought—

JA:

I'll tell you an interesting story that tells you how far—how buried I was in a cocoon when I was in college from it to study hard enough to make the grade. In my senior year, the first part of my senior year, I got—I was teaching physics to a group of pilots at Burns Flat Air Force Base. It was site base out there west of, I guess out there around Elk City. Maybe just a little bit east of Elk City. It was a site base. Strategic air command base. Bombers. So I would go out there once a week at night and teach them physics and so I'd drive up to the gate and they would ask me what I was going to do and I'd tell them, I'd just go on through the gate. Well one night, I drove up out there. Didn't know anything going on. And I drove up and I rolled down my window to discover the noise was deafening. You couldn't even hear what was going on. And so then the guard asks—he walked up there and got right in my window and says, "What is your business, sir, at the base tonight?" I said, "Well I'm here to teach the pilots a course in physics that I do every week." He said, "Not tonight, you won't."

DM:

[Laughs] They're a little distracted, huh?

JA:

And then I looked in my headlights. There were three guys standing there with automatic weapons. They had that base locked down. So I still didn't know what was going on. I just—so I turned around and drove back to Weatherford and turned on this little fuzzy TV I had and the Cuban Missile Crisis was going on. They were launching bombers. Nuclear warhead bombers. Off that base. Burns Flat, Oklahoma. Of course, if you drove out there today, it would just be prairie. Back in the day, it was a chrome dome and all that. So it was dichotomy of what was going on in the country. I was in this cocoon in college. Then I went to NASA and got in another cocoon and meanwhile, the Vietnam War protests were going on.

DM:

And you weren't hearing much about that.

JA:

I wasn't hearing nothing about that. And that dichotomy is still alive today, unfortunately.

DM:

Yeah, right.

TK:

I think the protests unleashed—I might chime in—I grew up in Burkburnett, near Shepherd. You know, we're all from the region and I'd say in terms of the protest like they had in San Francisco or New York –

JA:

Chicago.

TK:

It wasn't in Wichita Falls and it wasn't in Altus or it wasn't in Weatherford. It was kind of a different world. Those in themselves were cocoons of sorts.

DM:

That's true. Yeah.

JA:

Well see, I got you off track now. Get me back on track.

DM:

Well let me ask. I really have one more question for you and then you might have some more. Tell me about your steely-eyed missile man nickname.

JA:

Well it's funny how that's story's floating around.

DM:

We want the straight poop on that.

JA:

Well you know, I ran across the term, steely-eyed missile man a year before that. There was a group of thinkers even back in the—maybe it goes all the way back to military that they were kicking around this thing called steely-eyed missile man.

DM:

Is that right?

JA:

I think it, particularly in the early days of NASA, the people that worked in Florida, that were blowing up. Vehicles going off. You know, it just had to do with the way people react when calamities happen. If they act calmly. It was not a term that was used much in Houston. In fact, it was not even a term that they coined, I don't think, having to do with anything I did in real time. It just kind of evolved. People kind of discovered that term.

DM:

And applied it to you, though.

JA:

Yeah, and applied it to me.

DM:

Well was it not applied to you by a flight director or anyone?

JA:

No. There was no formal ceremony to anoint me.

DM:

Did anyone call you that at NASA?

JA:

No. Unh-uh.

DM:

That's interesting because I think if anyone was familiar with the term now, they would associate it definitely with you. There you go for your *Apollo 12* and 13 accomplishment.

JA:

You know, I think it's as simple as certain writers and certain people that write pieces look for labels.

DM:

They beefed it up a little bit. Put your—that's interesting.

JA:

Yeah. You know, if you think about it, I mean, I probably didn't go through all the wickets to deserve that reputation. I mean, I probably do fit the mold. But I'm not the only guy there who was a steely-eyed missile man.

TK:

Well it does have legs because they use that term again in that movie *The Martian*. Where that fellow was—he planned the turn trajectory and they said, "You sir, are a steely-eyed missile man." So the legend is going to continue on.

JA:

Certain terms just catch. Like "Failure's not an option."

DM:

That's right. Well then, the term was used in the movie, the *Apollo 13* movie, I think. I think it was applied directly to the character playing you.

JA:

Did they use steely-eyed missile man?

DM:

I think so. I think it was Ed Harris who was playing Gene Kranz. Yeah, it was Ed Harris who was playing Gene Kranz. And I think he refers to the fellow who was playing your character as the steely-eyed missile man so maybe that's where it really got fastened onto you.

TK:

It's in there somewhere.

DM:

It's in there.

JA:

You know, watching history being written, it's really an interesting process. In fact, it makes me go back and think about all the other historical accounts that I've read about, may not have happened the way—because I found out something about history writers. You take something as an Apollo program, that is so complex, you can't tell that story. So what historians do, they focus in on one or two people and then tell that story through them through that character. It's got to be that, you know, I got started off being contacted by certain people. It's kind of like there's a certain group of people that always get contacted. It's like the old line from the movie, you know, when some crime gets committed—I think it's out of *Casablanca*. You remember if you remember that movie.

DM:

Yeah.

JA:

You know, so what did the police captain do? He said, "Well I don't know. I guess I need to do something. Go out and round up the usual suspects." I'm one of those. I'm one of the usual suspects when they want to talk about space. Well now, there's something wrong with that. There's a lot wrong with that because that effort was so much bigger than me or any of the usual suspects that they round up. It's like the line—remember the old radio show, *The Naked City*?

TK:

Yes, I do.

JA:

The narrator would say that, "There's eight million stories in *Naked City*. This is one of them." You know, it's important for us to kind of stay humble on this.

DM:

Well maybe you're being a little too modest, though, because you were at some critical moments there making critical decisions at critical moments so, you know, maybe all of that is deserved.

JA:

Well I understand.

TK:

But you're the only one from Wellington and when we—I saw Wellington and I said, "David, you need to go talk to this gentlemen." So that's truth. That's the truth. All the other is fascinating, but I think because you were from that region with strong connections to it, this is worthwhile.

JA:

Well but yeah. But I tell you what, I still think about it from another perspective. It's what I used to think about as a result of flying the space shuttle. On a space shuttle, I moved over to an organization, which I then became the leader of to build all the software that flew the space shuttle. It's very, very complicated software. I mean, it's so complicated that I couldn't even tell you what the liability of it really was. We almost didn't make it work. It was a night and day effort by team. It's amazing. I didn't think when I left the Apollo program that I'd ever be involved in such a tight knit team effort again. Wrong. The team that built the flight software for the space shuttle *Orbiter* was just that kind of an effort. Was very complicated. So although, we designed it, redesigned it, scrubbed it, optimized it. Finally, made it work. Finally, it fit the computers. The little bitty computers were like this. We were trying to put this much in it. You know, I marveled when it flew. I never slept good at night because I knew it was humbling, the fact that disaster could strike any minute. I was no longer associated with it, but I'm nervous every time it flew. So when I think back about the Apollo program, it's humbling. It could've turned out so much different. There was such an element that it was meant to be. There was—we were just very lucky. If had gone a different way, you wouldn't be sitting here. I wouldn't be in this situation. So when you take a real realistic approach to look at it, still humbled. Still humbled about it.

DM:

Okay. I am out of questions. Do you have any questions? Any other comments, John?

JA:

Well you asked me a question a while ago that I didn't answer and that is do you ever see this happening again? Of such a tight knit will of the country lined up with some major technological achievement? And I said, well I don't know how to predict that. But I predict it based on this. The only time that it's really ever happened in history was when there was a threat. A threat that everybody identified with. Not just told about, but identified with. That's straight to this country. We're not all that forward looking to plan progressive steps out in ____ [3:08:43]. We're reactionary. We got caught with our pants down in World War II. We got caught with our pants down when Sputnik lifted off. The only difference is how we reacted to that.

DM:

How do you think people will react to China or another country going to Mars? Do you think the

US will step up?

JA:

No. I don't think that's going to trigger it.

DM:

Okay.

JA:

It has to be a security threat.

DM:

A real security threat. Okay.

JA:

I think it has to do with security. It doesn't have to do with—

DM:

Not as much competition as it is security.

JA:

That whole Cold War thing. That was serious.

TK:

One of the questions that I'm just prompted in remembering, while it was a civilian agency, there was fair amount of interaction with the military, to a degree. I mean, there was communication and discussion. Things of that nature. Was that always an easy relationship or somewhat interesting one, shall we say?

JA:

The—yeah, you know, if we're back in Apollo program. I didn't know it at the time. I knew we were racing the Russians, but none of us, at my level or a flying above my level knew exactly how the Russians were doing. I mean, I think, looking back, clearly the very top level people at NASA were tied into the intelligence of what was going on in Russia. Then we got stuck. NASA got stuck with having the space shuttle be the one size fits all space transportation system that got us hooked into the military. That was an oil and water mix. It just never happened. We didn't—to our degree—we didn't ever satisfy the military mission because that's a culture that they don't want to be dependent on a civilian agency and all the politics that go with that. To try to that would have set a requirements on the shuttle that I think severely curtailed its effectiveness because they very put some very stringent, technical challenges that changed the

way the orbiter can fly. Restrained it. So it was an unholy alliance. It's just there's something that the people keep trying to look over, then it goes with the programs as well as our social engineering. We try things. You got to respect culture. You got to think about culture is one of the perimeters when you start to do something. You can't just throw cultures together. Doesn't work. And there's lots of examples where you got to take that into account.

TK:

Within your engineering—

JA:

Then the military culture and the NASA culture just couldn't mesh.

TK:

And then the engineering mindset of the NASA, you know, versus something like DARPA, where DARPA [**Defense Advanced Research Projects Agency**]
—and I don't know how DARPA works. I don't know that you—but I'm sure within the military and then within the civilian, that's even more enhanced within how engineering. Well I'm only presuming they would be different.

JA:

Well NASA didn't have much connection with the DARPA stuff. NASA used some of the technology, of course, that was handed off, but they didn't interact with DARPA much. They're marching to their own drummers. Yeah, it—but in the early days of NASA, it was a culture that would be kind of akin to, say, how Google did its thing. You know, that's a different culture. How Microsoft did its thing. Apple does their thing. But boy, it's effective when you get it to happen.

TK:

It's interesting. That discussion that you mentioned the difference because they're parallel tracks. You know, you can go back into White Sands and the missile work there and you know that there were some sharing of information and data. Von Braun was part of that. Then he moves over to NASA. I'm sure it gets a little complicated.

JA:

Lot of parallel tracks. Yeah. Lot of parallel tracks.

TK:

Did you meet any of those folks that had been?

JA:

Never met von Braun. He was far enough ahead of me that I never met him. Yeah, it's interesting about that. I don't know whether it was you asked me this question or not or someone else. Did you ask me the question about Al Bean being from Wheeler?

DM:

Yeah.

JA:

Well I thought—

DM:

Did you know about him?

JA:

I answered you. I thought that—I said, well it was odd. I, first of all, didn't even know he was from Wheeler. We never had a chance to get together and talk about that part of the country.

DM:

Isn't that funny? I just think that was so ironic. That's what he's—how far is Wellington south of Shamrock? Maybe twenty miles?

JA:

Well Wheeler's—

DM:

Wheeler's north.

JA:

Well yeah. Shamrock's north. That's thirty. And then Wheeler's the next one. It's sixty miles.

DM:

Yeah, that's funny. It's just kind of interesting that on this *Apollo 12* thing that two people from the same little area were involved in critical moments.

JA:

Got connected because I was asking for the switch and he's the only one in the spacecraft that knew where the switch was.

DM:

Knew where it was. Yeah. Did you know, until then, that he was from Wheeler?

JA:

No. I didn't know until you asked the question.

DM:

Isn't that something?

JA:

I was—you know—I was so focused on what I'm doing.

DM:

Yeah. Well I'm glad you are because it paid off. [Laughter]

TK:

That's right. Thank you. It's been a great visit. Great visit.

JA:

We would get together. There was a famous watering hole down there that we all stopped after work.

DM:

What was it, by the way?

JA:

It was called Singing Wheel, but in Webster, Texas.

DM:

It was what?

JA:

It was called the Singing Wheel.

DM:

The Singing Wheel.

JA:

Wheel, as in round and round. That was our favorite watering hole and we go down there after training runs or just—you could go down there anytime after work and you'd find a half a dozen

people who were sitting there drinking a cool one before going home. Almost ruin their marriage. I mean, those kind of things. I can tell you that. What did we talk about? We would cajole each other about the way we did something, you know, and why did—if you screwed up, you either was going to get ribbed about. So even when we weren't working, we were talking about work and it was part of the learning experience.

DM:

You bet.

JA:

Because you learned what each other was doing. One of the things that I think contribute to my success, in particularly with the situation that I was in responsible for all the utilities in spacecraft, which means I was supporting some other very critical functions. I was not comfortable ever with just knowing what my responsibility was. I wanted to understand what everybody else was doing. So that then, the way that paid off, when they come to me and they said, "John, we got to have this turned on. I got to have it. I got to have it." I said, "Now, let me see. That's this subsystem. I think there's a different mode that that subsystem can work in and maybe you can get by with that." They, I think, knew that I knew enough about what I was talking about that they had to stop and address it.

DM:

Right. Okay. You were talking earlier about the interconnected things that you were interested in.

JA:

Interconnection. Because I—you get—I wanted to know not only how my subsystem worked. I wanted to know how the whole spacecraft worked.

DM:

Right. Did these discussions spill over into conversations with the astronauts? Like at your watering hole, was this also—

JA:

The watering hole. You'd run across astronauts at the watering hole—because they had very busy schedules. You'd run across astronauts at the watering hole on two occasions. One, if they were working with the flight control on a CapCom. It was going to be the capsule communicator, then yeah, you'd run across them. The flight crew, they're use it all over the country, but you would run across them, sometimes, in splash down parties. We also had a thing called splash down parties and you run across them. The guys that got to know the astronauts, and I never

really got to know one personally, was guys like Jerry Bostick because he lived in Nassau Bay and that's where they went and so their families would intermix.

DM:

Right. Okay.

JA:

But, you know, they would—as the missions were flying so quickly—they would come into our environment. They would train and fly and then leave to go on a world tour or something or whatever. And then the next group would show.

DM:

Right. It was just a blur of nonstop.

JA:

Someone asked me one time, and Jerry Bostick picked up on it, someone asked me one time, “Did you ever have time just to sit back and take all this in?” I said, “No, because to me, it was coming at me so fast. It's what you'd feel like if you were chug-a-lugging fine wine. You didn't have time to enjoy it. You just had to get it done.” Another reporter stumped me one time. After going through one of these sessions he took a really interesting question. He said, “You know, all those things you did and all those calls you made, did it ever occur to you that you were wrong? Could be wrong?” Stumped.

TK:

But you already answered that question.

JA:

I said, “No. I'm going to tell you honestly, it never occurred to me.” But I said, “One thing did happen to me. After the Apollo program, I then did space lab.” It's the one with the broken ring up here

DM:

Sky Lab?

JA:

Sky Lab. Sky Lab. And I said, I was probably—'73. I was thirty. I was twenty-nine years old by then. An old man. I said, “You know, the front end of that mission was a bigger salvage job that *Apollo 13* ever thought about being, and I was in the center of it.” Absolutely center of it keeping that thing alive while they tried to figure out how to dock to it and save it. But then—so that was—it was like six weeks that I was working eighteen hour days in front on the console trying

to keep that thing going. But then when the crew got up there and got the sun shade out and all that and got that thing stabilized. It would just go around. Go around a little. Go around here. Go around here. I was sitting there. I was watching that because all the experimentation was going on and all that, but nothing was happening in my area, it was just going around it. Like I said, it was like driving down the road and watching the amp meter on your car. It's just sitting there. It ain't moving. For the first time in my life, I told people that I started watching the clock. I couldn't wait for it to get to be four o'clock or five o'clock and that's when I realized I got to get out of this business because once you get to that phase, you become complacent. You'll start doing things that put you at risk. So that's when I decided to leave flight control division. I said, you know, this is a young man's job. I'm too old. I'm starting to second guessing myself. I need to get out of here.

DM:

You need some confidence. You need to step in with a lot of confidence to do that job.

JA:

Well yeah. The adrenaline. You got to have that adrenaline.

DM:

Yeah. Okay. Right.

JA:

You got to have this fear of failure. You got to keep that alive. So at that time, I had all the flight controllers, the ECOMs, trained. I was working in the back room looking at being an industry interface kind of a guy, when that was finally started happening and so I went back to my office in the administrative side wing of the thing and started reading about the space shuttle. I had a speaker turned on. I had the voice loop. I could tell if something happened and I could get back over there. My supervisor came in and he said, "John, what are you doing over here?" I said, "Rod, I'm reading about this new vehicle we're going to build called the space shuttle orbiter. that's going to be really exciting." That's what I wound up doing. I landed in the software side, in the avionics side of the develop team. Not the operations team, but the develop team. That turned out to be another biggest challenge of my life.

DM:

But a whole different kind of challenge, I guess.

JA:

A whole different kind of challenge.

DM:

That's good.

JA:

And it was a success. There were three fundamental technologies that had to be developed to fly the space shuttle orbiter. Main engines. That high performance engine had never been built before. Wasn't even sure they could do it. The heat protection system, the tiles, and the software. Those were the three things that enabled that thing to go. Everybody predicted that the software was finished last.

DM:

But it was the tiles that proved to be the problem.

JA:

It probably would've finished last except the engines and the tiles gave me the cover that they had delayed it enough. We got our software built. I was proud of the fact that they flew all those missions with that software. Kept changing it over and over and over again, but when they quit flying that software, and it never had a glitch while it was flying. There was never a case where it rebooted.

DM:

Wow. Golly. That's a lot of missions, too.

JA:

A lot of missions.

TK:

Now, the software was used as an assist or was it the primary method through which the shuttle was navigated through space?

JA:

It was the primary administer. It was the first flight vehicle that was ever designed to be a completely fly by a wire system and there wasn't really a good backup.

DM:

Oh. So if it had been a glitch—

JA:

If it glitched, it was over.

DM:
Golly.

TK:
There's no way a sticking rudder thing could?

JA:
They all went through the software.

TK:
Okay.

DM:
Golly.

JA:
That's pretty scary.

DM:
Yeah.

TK:
A lot of pressure on your team.

DM:
But it worked.

JA:
The reason that the sticking rudder and all that stuff had to go through the software and through the digital control system is that the shuttle, once you sawed the wings off of it to fly that Air Force mission we talked about, and you sawed the wings off of it to make it weigh enough. You know, it's interesting, spare plane they probably every designed that when it got overweight, the solution was to saw the wings off. [Laughter] That might be overdramatizing, but it's not much. Not much because at one time in the orbiters career, the headquarters guys came down and told Johnson Space Center, said, you know—and at that time, the orbiter weighed about two hundred and thirty thousand pounds. Projected to weigh a hundred and thirty thousand pounds and so the guy came down from the big shed and said, listen JFC, the only orbiter this agency has is a hundred and ninety thousand pound orbiter. You don't have—there's not an orbiter that's a hundred and thirty thousand pounds. In other words, get that weight out of that thing or we don't have a program.

DM:

Right, right. [Laughs]

JA:

Yeah. Yeah, that was a new deal to have it completely fly by wire. They threw another requirement at it is that when it comes to failures, you got to design the software. They gave us five computers to fly this thing. That was the architecture. The same software flew in all five computers originally. You got to design this software so that any two failures, you could still fly. So how you design around—pick any two failures that you can pick to still fly.

DM:

That is complex.

JA:

Well almost drove us in the—

DM:

How much of a staff did you have working on this?

JA:

Well the—when it was all said and done, I had about a hundred people in my office, NASA people. There were five hundred IBM people. At the later part of the program, they were—they split one of the computers out and put a so-called backup system in that and gave that to Rockwell and there's probably two or three hundred people working that. That was just the people who were building the software. People all over the country were writing requirements for it.

DM:

Right. Wow. That's another massive national effort, isn't it?

JA:

Yeah, it was.

DM:

I'll be.

TK:

Would you say then that the shuttle program carried on that sort of spirit that we were talking about that the country had toward the Apollo?

JA:

Within the team that we had it worked in, particularly in my area. You had the same—you had the same we got to do this. We can do it. We got to do it. But the—of course, it didn't have the national recognition. You know, you only get recognition with software is when it breaks.

DM:

Right. Right. Right. Yeah. I didn't know what was going on with shuttle software, but I knew what was going on with Apollo missions, you know, so yeah.

JA:

Was quite a feat. Quite a feat.

DM:

Do you miss all that action?

JA:

Do I miss that?

DM:

Do you miss all that action?

JA:

Well if you started another Apollo program, I'd volunteer today.

DM:

Yeah.

JA:

And I don't mean so much about—I'm talking about the environment. Recreate that environment and I would volunteer. I got to where working at NASA wasn't a lot of fun because steeped in politics. Internal and external. So you know, I retired at fifty-seven. That's pretty young.

DM:

You'd put your years in though because you started at twenty-two.

JA:

I put thirty-six years in. But you know, when you get to a situation where you're working on a program and you're sitting down trying to do stuff with people and they bring in different agendas to the table. Like rather than priority being on doing what's required for the mission, they start worrying about well how can my institution profit from this?

DM:

Yeah. That's a deterioration.

JA:

That's a deterioration and also, retired in 2000. You could tell the space station was finally going to happen. It had gone through so many machinations in my career. I mean, I was—had served in different capacities in that program and it was very—such a situation of fits and starts. But it was finally going to happen. You could tell the Russians were involved, and that was not any easy thing to work with. It became a political burden. Still is. And looking back on the International Space Station Program and people are going to say, John, I can't believe you're going to say this. There were a lot of places where it was about to be cancelled, about to be cancelled. Sometimes, I was involved in efforts to save it. Maybe we should've just let it fail, because we're stuck in the earth orbit [3:33:46]. They're just going around in circles.

DM:

Do you think without that they would've had more of a—

JA:

They were assuming all the resources. There were a lot of resources in that thing to watch it go around here.

DM:

You think without that we would have had, perhaps, a Mars initiative?

JA:

Might. Might. Might not even—agency might not even be here. We'd either done something else and got the will of the people behind it. But given that when Obama came in, there wasn't a space station and might not be a NASA because he gutted the program. He gutted the program. We had a major initiative with a new vehicle and a new booster and a new mission. Constellation program. Orion was a spacecraft. I consulted on that for a while, but you could tell Obama—when that administration came in, they were not interested in that. What's really interesting for me to watch all that is that Obama's big focus up front was to save jobs, but they were all union jobs.

DM:

Yeah. Cost a lot of—

JA:

But he gutted NASA.

DM:

Right. And cost how many jobs would you say?

JA:

Oh yeah. I mean, you saved pretty much the core civil servant group, but the contractors were just designated. So he didn't count those as the same kind of jobs. He likes union jobs. At least that's my—

DM:

Right.

JA:

I have nothing against union. It's just that if he was worried about jobs.

TK:

Political.

JA:

But I don't want to get off on that.

DM:

[Laughter] Well do you have any other general thoughts?

JA:

That's history. Now, I—it was a hell of a ride. I can't believe that I just showed up at the right time at the right place with the right training and I got to give the physics department in the Southwestern all the credit. There were three professors there that just made the difference. I mean, they just got me into physics and they stayed with me until I learned it all.

DM:

Can you name them?

JA:

Yeah. The guy that ran the department is a guy named J.R. Pratt. And then there was a guy named Wheeler that came along.

DM:

Wheeler?

JA:

Wheeler. Pratt taught a lot of the courses. Weaver taught a lot of courses. Jones taught a lot of electronics and electric steam magnetism and so forth.

DM:

Remember his first name?

JA:

Perry.

DM:

Perry.

JA:

Perry J. Jones.

DM:

How about Wheeler?

JA:

Don Wheeler, I believe. Don Wheeler. Yeah, I think it was Don. J.R. Pratt.

DM:

Did they direct you guys? You and the others from there toward NASA?

JA:

No.

DM:

Okay. They were just good guys.

JA:

The guy that directed me towards NASA was Richard Bates. He went to NASA two years before I did. I mean, I can give you his contact information.

DM:

I'd love it.

JA:

Let's see. Who else do I need to? You wanted—I can give you Tom Weichel's contact information.

DM:

Oh, that's good. How about Jerry Bostick?

JA:

I can give you that contact information. He's right down the street. I can tell you, he's one of my biggest fans. I can warn you about that.

DM:

Okay. [Laughs]

JA:

See, what else? I was going to print you out the story. A little interview I did with—I mean, questionnaire. It's not really an interview that I did.

DM:

Yes, right. And also—

JA:

I need to take another break.

DM:

Sure.

JA:

What time is it? It's 1:25.

DM:

We'll go ahead and turn this off.

End of Recording