Mr. Roy Johanson, Jr.

Oral History

Kennedy Space Center

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Interviewer:

Gregg Buckingham

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All Points Logisitics

Gregg Buckingham: [Tape is cut at beginning] … and it's March 2nd, 2004 and we are at the Visitors Center in room 2416 for an interview with Roy Johanson, who's retired from NASA this week. Roy, I wonder if you could just start by stating your name and your current address so that we know where to catch up with you after the interview.

Roy Johanson: Sure. It's Roy H. Johanson Jr. at 1864 Cashew Courtway in Titusville, FL. And the zip there is 32780-4682.

Buckingham: Ok. Well, let's talk a little about before you came to NASA. Where were you born and talk about some of your, your early days before going to college.

Johanson: I was born and raised in, I meant, I was born in 1948. I was raised in Memphis, Tennessee. Went to school in the public system there in Memphis. And then when it became time for college, I went to University of Tennessee at Martin, Tennessee, which at the time was an offshoot of the main campus, a little bit closer to home. Wasn't quite as expensive and I could get my first two years of engineering there. And then I went to, I had to transfer to Knoxville, Tennessee, the main campus of UT in order to finish my degree in aerospace engineering, which I completed in 1971. There were six of us in the class. There was not a real big aerospace engineering class at the time. But, it was quite well, quite good. The education I got in what Tennessee classified as aerospace engineering is probably what most older engineers would just consider engineering in the pre-1950 time frame. Because in aerospace engineering we got a little bit of electrical engineering, mechanical engineering, we got our aerospace engineering,

and just about, well, we touched on every facet of engineering available, but our majors were in aerospace and trajectory analysis and things like that.

Buckingham: Ok. Did you come out of, skipping back to the family a second, did you come out of a big family, a small family…

Johanson: There was… I have a brother and a sister who both still are living. My parents have passed away in the past couple of years. But, we had a family of five and I was the only one that completed college. My sister went for two years and my brother went to the Navy and then came back and went to a technical school, became a draftsmen and had his own business and now he's moved on to other things.

Buckingham: Ok. Now you were about ten, I think, when Sputnik happened. Do you remember that or…

Johanson: Well Sputnik was in '58, I believe '58, but I was ten… You're right, ten at the time. Yeah, I remember everything that was going on. The Space Program has always fascinated me. I've always played with model airplanes, control line (???), and then radio controlled. I've just always been fascinated with flying.

Buckingham: So, Roy, I'm wondering what was it that made you choose engineering, or led you to choose engineering?

Johanson: Well, I don't know. I always remember wanting to be an engineer. When I was in seventh grade, in high school, I made out, using different catalogs and whatnot, a curriculum I was going to follow through my college career. And during that next, that was the seventh grade, so five, nine years, I varied two courses from what I wrote down in… when I was seven.

Buckingham: That sounds like an engineer.

Johanson: I know. I know it does. But no, I had it planned out and that's the way I attacked it. And I was quite happy with that, to be there.

Buckingham: Now you're in college in the 60's and graduated in '71.

Johanson: Right.

Buckingham: So, obviously we've landed on the Moon by the time you graduated.

Ray: In 1969. Landed on my sister's birthday. July 20th, 1969.

Buckingham: Ok. Did you do any internships or work while you were in college?

Johanson: No, I would've liked to, but I had to work my way through college. So, in those days, when I was in college, you had to have about a 3.0 to be able to qualify for

the co-op program. And I worked 40 hours a week and carried a full engineering load to boot. And I was happy with my 2.7, you know, thrilled to death as a matter of fact with my 2.7.

Buckingham: Ok.

Johanson: And I kept… and to prove to myself that had I had the money, where I didn't have to work, that I could have done the job, I had saved up enough money so my last quarter at Tennessee, my senior quarter, and I had two flunk out courses that quarter. I had put them off. But, I quit all my jobs and just concentrated on my studies, and I had a 3.95 for that quarter. So, that proved to me that, you know, I could have had the higher grades had I been able to devote my time to pure studying.

Buckingham: Ok.

Johanson: And when I went to interview for jobs, the government, because I only had about a 2.5 at the time, the government was the only one that seemed interested enough that what they did is they, when they saw it was 2.5, they turned my sheet over to see if there might have been a reason for that. And they noticed that I was working 40 hours a week and they asked me how did I have time to go to college. And I said, "Well, you know, you do what you have to do." And I got put on the registry. And it was quite interesting because I got notice that I was next in line, you know how the government registry works. Well, I don't know if they still have it or not. But in those days, you

qualified, essentially for the government in the position, engineering, and they would put you on a national registry. And then the first Center that put out an announcement, where they couldn't fill internally, and they needed to hire from the outside, they would go to that registry and take your name off that list. And I got notified that I was next on the list and I honestly thought I was going to end up at the Naval Ship Research and Development Center, (unintelligible), Maryland. And while I was waiting for the announcement, I… when I graduated I didn't have a job. I went back… that was when all the major aerospace manufacturers were laying off. And I went back to driving a truck, which was the way I had made my way through school. And while I was waiting for word from (???), I got an announcement through the placement office that KSC was interviewing for engineers. And I interviewed with Charlie Francois.

Buckingham: Oh, Charlie Francois.

Johanson: Yeah. He was personnel at the time. And he looked at my application and he was a little concerned because I am as big as I am. And he said, "Well, if you pass the physical, you're hired." And I knew I was going to pass the physical. And …

Buckingham: That seems a little, I mean odd to me. I know at that time Kennedy was downsizing.

Johanson: Yes.

Buckingham: Because the Moon…

Johanson: That's Right.

Buckingham: …projects were over, well, almost over, not quite. And so I was interested in that you got hired at that time. So you just got picked by Kennedy because your name was on the list?

Johanson: Right. And I was hired into what we originally, what we now call the ATD program. The accelerated training program. There were twenty five of us hired that summer of '71, and we were supposed to go around, or supposed to spend a month in every directorate from the Center. And after we were, had been to all these different directorates, then the different directorates would essentially bid on us to see who goes where. As it was, I got down here about three days before the program started. So, not having anything else to do with me, they sent me out to what was then known as LV, Launch Vehicle, out to the liquid oxygen area. And they took me out to the pad and showed me the launch system and what they did out there as far as engineering work. And, I'm an old get-your-hands-dirty type of guy and I loved it. And so, I got back to the office and Ed Dickinson, who was the chief at the time, asked me what I thought and I said, "I loved it." He said "Well, would you like to be assigned here?" I said, "Yes, sir." So, they called personnel, and actually I was assigned before the program started. But they let me go and work in the program, or go with the other students in the program. They decided I at least needed to at least go through the LS spacecraft organization in the

LV. I went through LS for a month and then I spent about, about two weeks in LV. And one of the engineers under Ed Dickinson on the launch system had a heart attack. And they notified Charlie, now, well, as a matter of fact it wasn't just Charlie. They notified O'Hara, who was Dr. Gruene's assistant at the time, and told him they needed me right away to help, to fill in. So they brought me out of the program and I got put to work immediately. My first job was taking a part to locks pump set up in the lab because we were having leaks with the seals. So, to me, a lot of the guys spent, you know, two years, and quite honestly, when you are only in an organization about a month, a lot of them did a lot of office boy type work. And it really… a lot of the guys didn't like it.

Buckingham: Right.

Johanson: We lost probably… 30 percent of the engineers quit because they couldn't see the end of the road, so to speak.

Buckingham: Ok.

Johanson: But I went to work immediately and I was, I really enjoyed it.

Buckingham: Ok. Well, let's set this up. Remember who was the director of the vehicle operations at the time?

Johanson: Hans Gruene.

Buckingham: Hans Gruene. And so, you were out at Pad 39?

Johanson: I was at 39. I was one of three hundred people on the pad.

Buckingham: And this is two or three launches from the end of the Apollo program?

Johanson: Yes. My first, I heard on the day after Apollo 15 launch.

Buckingham: OK.

Johanson: I was here for 16 and 17. Then I worked, of course, all the Skylab missions and the ASTP mission. And when that was over, I went across the river to expendable launch vehicles.

Buckingham: Ok, let's stop there a minute. Now what do you recall about, do you recall who was head of the spacecraft operations at that time?

Johanson: I think it was Bob Sieck. And he shared it, he shared it… they… because things were starting to happen. They had split it up and shuttle was starting to be thought about. They split it up and they had divided it. Bob Sieck was one of the directors and they had someone else… I can't…

Buckingham: That's ok.

Johanson: Charlie… Charlie something. I can't remember his last name.

Buckingham: Ok. Do you remember as you went from the vehicle side to visiting the spacecraft side any differences between those two operations?

Johanson: Oh yeah. There was a lot of difference. The… like I said, the LV side that I had opted to go for was more of a grunt-type hands labor, hands-on job type of a job. The spacecraft side, the guy primarily seemed to be in the control room most of the time. And they were testing hardware that had already been built and tested by the manufacturer. But we were having to retest it using, at the time, what we called (???) rooms, these were control rooms at the top of the O&C building. And it was a whole different type of philosophy. I did notice, a little bit to my chagrin, that the pay grades in the spacecraft were almost always a grade higher then what the same position in the launch vehicle was. But, you know, in those days, the pay was nice, but we weren't here for the pay. We were here for the commitment. And that's the way we worked.

Buckingham: And now talk a little bit how we're… Apollo 17 winds down the Apollo program and Skylab is coming.

Johanson: Skylab is coming.

208

209 Buckingham: Talk a little bit about your role in Skylab and then, also, any differences
210 you might reflect on between the drive of the Apollo Program and the Skylab.
211

212 Johanson: Well, the biggest difference in the Skylab program... course, I was still in
213 propellants out on the pad, and the big systems, super-sized systems that we used to load
214 the Saturn with were no longer used. Matter of fact, now after Apollo, we tended to use
215 what during Apollo was the (???) system for the vehicle. We used that as the main fill
216 system for the equipment because the Saturn 1B (which launched all the Skylabs, and of
217 course, in ASTP) was a lot smaller vehicle. Now, the one interesting, a lot of fun we had
218 with it, was the fact we had to build a milk stool – they called it – on top of the mobile
219 launcher. And then they ran all the plumbing and everything up to the top. One of the
220 most unusual things, I guess, that happened to us is working around that steel and iron all
221 the time and being out on the pad, I lost all fear of heights. We'd go up on the platform,
222 which was about 200 feet above the ground - no guardrails. And just, we'd just work
223 around there all day long. Cross the edge, look over, sit on the edge of the platform with
224 our feet dangling to eat lunch. Stuff like that, you know. And then we'd get people come
225 in here from Marshall and JSC, and we'd take them up there. Once I took a bunch of
226 guys up with me, and I didn't even think twice about it, and I headed out across the milk
227 stool and, or the Torus ring, which was on top of the milk stool. And all of the sudden I
228 notice there's this deadly quiet. And I look behind me and there was nobody there. And
229 I hate to admit, but the first thing I did was go look over the side to see if they fell. And I

didn't see a commotion so I said, "Well, they didn't fall." So, I started backtracking and all of them were frozen at the top of the steps.

Buckingham: Oh, Ok.

Johanson: They wouldn't come out on the platform because there were no guardrails.

Buckingham: Well, for someone who might listen on, to this interview, that the milk stool, the Saturn V had the first stage which was not.. I guess…

Johanson: The S1C. We didn't need that anymore. But, the, what used to be the SM . . .we didn't need the SII stage either, the second stage. But the SIVB, the fourth stage on up was the same. So, what we did, rather than rebuild the entire facility, we built what looked like a giant milk stool and put it on top of the platform so that it raised the Saturn 1B up to the level where the SIVB and the spacecraft swing arm and all the upper swing arms would match up with it. But we had to run the propellant lines for the launch and the RP1, which is what propelled the S1B. We had to run them across the, what they called the Torus ring and then underneath the milk stool and then up through the bottom to the rocket itself.

Buckingham: Ok, now, and then, let's talk about Apollo-Soyuz just a little bit. Of course, that's just one launch. It's a one shot …

Johanson: Right.

Buckingham: …with the Russians. Still on propellants for that?

Johanson: For us, it was the same as the Skylab because we were still launching S1Bs. We were still using the milk stool. And our tanking procedures and everything were the exact same. The only… the big difference is that finally for ASTP, we finally got the computers to a point where we could totally automatic load the vehicle. We didn't do it automatically. It was still done manually, but with our… we had nine panels, control panels in the firing room. And it took all nine men to load the vehicle, but we had developed the software so that, by then, so we could automatically load. And that was the first time we ever had it where we could do it and then the program ended.

Buckingham: So, for your early launches you're not out at the pad, you're of course, you're in the control room.

Johanson: The control center.

Buckingham: But you're, you're what? Pushing buttons or something to turn…

Johanson: We were flipping switches to turn valves and we had manual control of the pumps. We had to what we called "rev them up" - start slow and bring them up to speed. All that was done in the firing room by one of, you know, one of the nine men and it was

done by purely what we called hard wire. We throw a switch, something happened out at the pad. It was not computer controlled in those days.

Buckingham: Now, by Apollo-Soyuz, or ASTP, it is possible?

Johanson: It is possible. It had not been proven yet, so they didn't want us using it. But it was fine. Computers were finally starting to come of age where they could take control. There was a lot of concern using it for liquid oxygen, because liquid oxygen you cannot stop the flow once you start. You have to either be tanking or detanking. If you stop the liquid in the line it would heat up and you'd get a gas bubble there. And that bubble would go up the line and once it gets… the higher it goes, the more it expands until it totally fills the line. And you have a bubble trying to go up through the line and the weight of liquid oxygen, which is 10 pounds a gallon, would finally overcome the bubble and the bubble would collapse. And the column of liquid would fall. And when it hit the liquid coming up, there'd be a tremendous shock. Kind of like the water hammer you have at home, but about a thousand pounds greater.

Buckingham: Ok.

Johanson: And there was chance of rupturing the line.

Buckingham: Ok.

Johanson: So, there was a little concern with using the computer at the time.

Buckingham: Now, just briefly, before we go onto your ELV experience and payload experience, think back to the Center. The Center from this time period, '71-'75, the infrastructure is basically here. Were there any big changes that you remember, maybe in terms of State Road 3 coming in or the bridges or any kind of infrastructure changes?

Johanson: No, not really. It was…

Buckingham: It was pretty intact by the time you got here.

Johanson: Pretty intact by the time I got here. As far as getting work on it. I used to hear the horror stories from the guys coming in on the north road around Playalinda, and the potholes in that back road. Things like that. But, most of that stuff had been repaired by the time I got here. And we still did have the Playalinda gate. And those of us that worked on the pad, that lived in Titusville, quite often came in the North Road, rather than coming down NASA Causeway and Kennedy Parkway, you know, got out to the pad that way.

Buckingham: Ok, so now, ASTP is over. Now there is going to be a lull in manned vehicle activity until the Shuttle. And you went to the ELV side.

Johanson: Yeah. They were going to send me to DE.

Buckingham: Which is?

Johanson: Design Engineering. And I'm not a designer. I'm a field engineer. And I told them that I… that I'm (???). And they said, "Well, we need some people over on expendable vehicles if you want to go over there." And I was gone in half a day. And we know, I interviewed with Jim Womack, who was the chief at the time of the mechanical bunch, and our directorate was John Dodson. And he says, "Roy, we're going to bring you over here under the premise of Viking." We were trying to get the Viking missions to Mars launched. And he says, "But I really want you to be the ground support man out at Complex 36," he said. Well, I said, "Well fine. What system?" And the expendable vehicles have always worked differently than Shuttle, or Apollo. And he says, "All of them." I said "What?" You know, over on Apollo, we had like, in liquid oxygen, we had six men. The nitrogen guys had at least six. Hydrogen had at least six and things like . . . And now he's wanting me to be the sole NASA representative for the entire ground system at Complex 36. Everything was mine.

Buckingham: Not just propellants?

Johanson: Not propellants. Propellants, gases, tower, transportation, spacecraft encapsulation, the whole nine yards. Anything except the vehicle was mine. And, of course, I took a big gulp because it was a hell of a challenge. But, I said, "Fine." You know, to me, man, I get to really get my hands dirty now. And so, I came over and I

worked on Complex 41 as backup for Viking I and II, missions to Mars, and Helios, which was the interplanetary at the time. And then I went over to 36 and my first launch over there was AC 36. And I was there until… 1988, I believe… yeah, 1988.

Buckingham: Ok.

Johanson: And I had, I got about 50-some odd launches, yet the only time I was there, because of the way expendable launches were configured, whenever there was a Titan-Centaur launch, I backed up the ground man on 41, and whenever there was a Delta launch, I backed up the ground support man on 17. There were three of us. I had 36. I think Doug Ahrens was in charge, or 17, and I forgot Tom's last name. He was over on 41.

Buckingham: Now in these days of the expendable program, the launch vehicles, were they purchased by NASA or were they… today we buy launch services.

Johanson: Right.

Buckingham: Was it the same?

Johanson: I believe, I believe they were our vehicles. We bought them. And then we had… we really… it's a lot different today. Today they're getting a little bit more like Shuttle and Apollo was from a contract management standpoint. When I started over

there and through 1988, the NASA engineer had hands-on. We physically took part. And…

Buckingham: They were preparing the vehicle?

Johanson: In preparing the vehicle. And when we were in the firing room, if you took our badges off you couldn't tell who was contractor and who was NASA. Because we had started to get computer systems. And what we used to do was, we used to tap what we called data stream. It's all the information coming back from the pad and the vehicle to the blockhouse. We had tapped off of that and ran it to the NASA computer up in the E&O building and then back out to the blockhouse to the NASA consoles. So I was looking at the same data as the contractor was, but in a different way. I had my own source. And it really helped because a lot of time, you see, I'd have my consoles on and I could see trends. Our computers were (unintelligible) to spot trends and things like that. And so I would tell one of the ground engineers. "How are things in there?" I would say for instance. Henry Eskinson was our ECS engineer for our General Dynamics at the time. And if I saw something going, I had had a monitor installed above his console, and I would call the TV guy and say, "Hey, put my screen, number 32 above, on screen number 65," which was Henry's. And he'd put it on there and I'd physically, I'd actually get on the net during a count. I'd call him. I'd say, "Henry, look up at your console," or "at your monitor." And he would look up and then say that's the, you know, for instance, the spacecraft air conditioning. And you'd notice, we got, we were warming up there and getting about ready to go into a yellow line, which is caution. And he'd say, "Yeah," he

says, "Thanks a lot," because he could see it. Then he could go back and confirm it with his technician that was sitting on the strip charger. But the way they had to do it, if you called in the technician, he had to go to the strip charger and unroll it so he, because he could only see four minutes at a time. I could see a half hour. And he may not see a rising trend and he'd have to unroll it. And he'd say, "Yeah, it's right here, Henry." He says, "Roy's right, it's starting to increase on us." And he'd have to roll it back up and put it back in the strip charger.

Buckingham: Well, a couple things. You came over to ELV from the vehicle side. Did you, were there a lot of other folks who worked the vehicle side in the Apollo…were following programs who moved to ELV?

Johanson: No. There's not many of us at all. I was one of the few. Most of the guys went to the, either design engineering or whatever was required to support the Shuttle build-up at the time.

Buckingham: Ok. And, talk a little about, here we had Viking. There were two Viking missions. They were going to land on Mars.

Johanson: Two Viking.

Buckingham: This is about the '76 time frame.

Johanson: Yeah.

(conversation in background)

Buckingham: And how did you interface with the actual Viking spacecraft?

Johanson: Well, I was always in charge of the ground support group. I always worked from the ground systems. And you have to take kidding, you know, the guys just called us glorified gas station attendants and things like that. But, like I used to tell them, I said, "If my ground systems don't work, you're not going to go one inch off that pad." And, so, I always liked ground systems. The main reason, and… whenever you're working the vehicle, and this still goes today, if you're working Shuttle or if you're working expendable launch vehicles, if something goes wrong, the engineer very seldom is the one that gets to decide what to do. Management gets involved and they tell you what they want to do. Working with ground support equipment, when I come running up from the blockhouse, management would say, "Are we going to make the launch?" And if I said yes, they didn't really care how I did it or what I did as long as we got through and made the launch. So, I was pretty much free to exercise my engineering ability and make real-time decisions on what we repaired, how we repaired it, and what we needed to do.

Buckingham: And so that brings up a point. I know on the vehicles, spacecraft vehicles especially, there are configuration control boards and…

Johanson: Right.

Buckingham: ...fairly closely monitored, any changes that are made to the vehicle. How does that work in the GSE or pad...

Johanson: We did have some configuration control, but it's nothing like the vehicle. On the vehicle, every component, every screw, everything is under configuration control. Under... in the GSE world, you have to realize, in a lot of cases, we were using the equipment that was designed in the early forties. Built between '45 and '50 and we were still launching with them in 1985. So, ours was more and more a job every day of, we couldn't get spare parts anymore. They were, been out of production for 15 years. So you had to figure out ways around what broke or could you go buy a new piece of something and splice it in to take the part of the piece that died on me. So, that's why I say it was really interesting in the GSE worked from that aspect.

Buckingham: Ok. Ok. So, you know, let's talk about Voyager and Helios. Was there anything different about those missions from your aspect?

Johanson: Not from my aspect. Again, I was still ground support.

Buckingham: Ok.

Johanson: And I've always been associated with that until about the early eighties. And then I took over the spacecraft encapsulation. But by then, by the time I got that far, by the time I saw a spacecraft, it had been tested forward (???) and was ready for launch. And I simply went over and made sure that the nose shearing halves went together properly without any problems, and that we got mounted on the transport trailer and got the spacecraft transported out to the pad and erected on top of the launch vehicle and ready for launch.

Buckingham: Ok. Let's see, and also, about this time, again just for, to put it in context, I believe in the early eighties when the Shuttle really started flying, the intent was to discontinue the expendable vehicles. And then Challenger happens and the country rethinks that position and we again plan on flying them. Do you, talk to me…

Johanson: Ok, well, we were starting to peter down and we just had a few missions left and then we got word that what they wanted to try to do was put Centaur, which was the second stage of the Atlas, inside the Shuttle. We had finished all of our mission on Complex 36A and we actually rebuilt the inside of the tower, so that it looked, it was a 100 percent simulator for the payload bay in the Shuttle. Now, the reason we did that is because we knew that as soon as someone said, "Put a live liquid oxygen/liquid hydrogen vehicle inside the payload bay," they were going to say, "What about leaks?" You know, what are you going to do? And so, by building that simulator on 36A, we had a simulated 1307 bulkhead, which is the rear bulkhead of the Shuttle, which has vent hose in it that flows back into the engine compartment. We had sensors on each of those hoses

so that as we were filling the hydrogen and the oxygen, we could get a perfect profile of how much it leaked and how it leaked. And we did about three tankings, that I remember, inside that payload bay simulator, totally enclosed, just like it would be on the Shuttle. And we developed a family of curves so that we could exactly tell them yes or no, it was us leaking or not. And it was probably one of the most high-fidelity simulators that was ever built in my opinion. And we had a great, great simulator. And we proved that Centaur could do it. And then Challenger came along and unfortunately, politics got in the way, and there was no way, as they put it, "We aren't going put a bomb in the payload bay of the Shuttle."

Buckingham: The Centaurs were scheduled to fly just a few months after Challenger happened.

Johanson: Right. Six months. We were supposed to fly that summer and then that, Challenger was in January. And that unfortunately ended that. And I tried to get NASA management to consider letting the payload people know that we had a perfect simulator at 36, that they could put their spacecraft in or whatever and feel, get a feel, for what it was going to be like when they were closed up. But they told me that the maintenance costs and everything else… nobody was really interested at that time in the game. So, that pretty much died and went away and we lost that capability.

Buckingham: Ok, now, I have a few other questions that I want to make sure that we get in, so let's take… '88, you leave the ELV program. Take me through the nineties.

Johanson: Well, 1988 the Challenger happened. Or '86.

Buckingham: '86.

Johanson: And in 1988 there, while they where preparing for reflight, an announcement came out across, on the expendable launch vehicle side, the river, that they were looking for engineers for Shuttle. And I was a little perturbed, because they gave the announcement to all of the vehicle guys, but I was not given the announcement. Norm Carlson was the chief over there, the division chief, and I knew Norm and I called Norm. And I said, "Do you have something against good GSE men?" And he said, "No, not all." And I said, "Well, I'd like to interview for the job." He said, "Come on over." So I went over and they were looking for MT… Master Test Directors, MTDs, and operations people. And I went over and interviewed for an MTD job.

Buckingham: Talk about that job just for a minute.

Johanson: The NASA test director is the NASA engineer that sits on the console in the firing room during all tests and monitors the operations for NASA, from the firing room. Now there is more, there is NASA systems engineers that follow from the field and out on the vehicle where the testing is going on. But the NASA test director is kind of the orchestra leader for the NASA testing. And Norm told me, at the time, that he wouldn't say no that I couldn't be a test director, but he would really prefer my experience to be

used as a vehicle manager for Atlantis. And...or for the Shuttle. And, at the time, the vehicle manager's job was essentially, was to go around and hunch over the day-to-day operations and make sure the orbiter and the vehicle got checked out for launch. And so I said, "Well that's fine. I'll be happy with that." And they made me (Launch Director?) on Columbia. And then the launch schedule came out and we found out they were going to launch, I was the last of three vehicle managers chosen. Tim Bollo was chosen first and then Bob MacCurry. Tim Bollo was given Discovery, OV104. And Bob MacCurry was given Atlantis or… I'm sorry, Atlantis was OV104. Discovery was 103. And I was given OB102, the oldest ship in the fleet, Columbia. The launch schedule came out and showed Columbia launching first. And one of the other vehicle managers, upset because he had been there longer and he thought he ought to get the first one and so forth. And they called me in and asked me if I wouldn't mind giving it up and letting him have mine and me go to 104. And I said, "No, it doesn't make any difference to me." And so, then they swapped me over to OV104, Atlantis. And I stayed as Atlantis' vehicle manager for the next three years. And got, did the last two DOD missions we had here at the Center. And surprisingly enough, it was Atlantis that was assigned the Magellan and the Galileo missions. And I say surprisingly because they were originally supposed to go off on Atlas-Centaur. And I worked with those same engineers when they were set for Atlas-Centaur.

Buckingham: Ok, so…

Johanson: And then they changed to the Shuttle Program. And now here I come, back over to shuttle, and I'm vehicle manager on the same missions that I was working when I was working the unmanned missions.

Buckingham: Ok.

Johanson: I worked there until about '91 as vehicle manager on Atlantis. Of course, the way worked at that time, is when my vehicle was not in the slot primed, next one to launch, we used to back up the vehicle manager who was prime. So he could have a day off occasionally and back in those days those were before our rules of how we can work here at the Center. Maximum of 16 hours a day and no more than 6 days in a row and things like… back in those days, I know one stretch I worked about 28 days in a row and I used to work 6 to 6 Monday through Saturday. And that was, you can't do that anymore. But, I just loved it. I didn't do it because I had to. I did it because I wanted to. Just had a blast doing it. And then after… towards the end of '91 they, Larry Ellis was given the job of foreman of launch and landing project office. And he came and asked me because, primarily because of my interest and knowledge in computers, if I would go to project office with him. And I said, "Well fine, what do you want me to work?" And he said, "We're going to try to start introducing computers in the workforce here, laptops, in the workforce here at KSC." And he says, "I want you to be one of the two project managers for SPDMS." And I said, "Well, what's the other project manager going to do?" And he said, "Well, he's going to handle the money side of it." And I said, "Well that suits me just fine." Because, I said, "I'd rather work on getting the stuff installed on

the floor than having to deal with money." So, if I ever needed anything I just turned around to the other engineer, and I'd say, "Hey Gary." Gary Johnson was the other project engineer. I'd say, "Have I got money to go do so and so?" He'd come back and he'd say yes or no. If he said yes, I'd say, "Fine, let's go get it." Or no, I'd say, "Well, we'll work something else." And we'd go try to work it another way. And I was there for five years.

Buckingham: And SPDMS?

Johanson: Shuttle Project Data Management System. The techs used to call it speedy mouse, was their acronym for it. And…

Buckingham: It was?

Johanson: It… We were trying to get towards what was known at the time as a paperless environment. Not truly, 100 percent paperless. But you got to realize in those days, especially during Apollo, one of the sayings used to be, "We can't launch until the paperwork weighs twice what the vehicle does." And that was a true statement. And as shuttle came along we introduced computers, so now, as they completed a task, they could go to the computer and essentially sign the task that it was done. They didn't have to go physically stamp a piece of paper. They electronically signed that they completed it and the computer kept track of what was being done.

Buckingham: Ok.

Johanson: And I was real proud because of what we called "shop floor control." That's where we used the computers on the shop floor; where the actual maintenance and works and the build-up and the orbiter and the payloads were… that portion that I was in charge, project manager for, we completed that and turned that over to the contractor. Unfortunately, the engineering portion was never completed. They're still struggling with it today. But, I was able to get the, the (???) put on the computer.

Buckingham: Ok.

Johanson: So they all used it. And it was a challenge because in those days, you know the most, the thing I heard the most was, "I'm not a damn typist – I don't want to use a computer." And if you go out and try to take them now, you better duck because they'll slit your throat. If you go to take them now. But I spent five years there and then, when we finished the project and turned it over, and I did have some people get mad at me because I declared the project complete. Because they were saying, "Oh you (???) this for a few more years." And I said, "No, as I understand, my job as a project engineer is to work myself out of a job." And we had decided when we got it where we could turn it over to the contractor, that's what we would do and we'd back out. And so I turned it over and for about two weeks they weren't really sure what they were going to do with it. And then they came down and they said, oh, they're going to send me to a group, and basically I was going to become what we called a bean counter, counting papers,

processing papers all the time. And I said, "No, I'm not going to go for that." And I went back over one day and talked to Jim Womack, my old boss in expendable vehicles. And I said, "How would you like to have me back?" He said, "You're kidding, right?" And I said, "No, I'm dead serious." I said, "I'd like, I want to get back into hardware." And he said, "Well, I'll take care of it." And that was on a Friday. I saw him Friday morning. I found out later Friday afternoon he went to personnel and had my paperwork processed. And Monday morning I got a call at eight o'clock from personnel, saying you've been transferred. Which they said was the fastest transfer they ever knew to happen on the Center. And about 10 o'clock my boss over on Shuttle and Jay Honeycutt come walking in the office. And I knew we were trouble, I was in trouble. And I said, "What's the matter?" And they said, "What do you mean you're leaving? We just got word that you had been transferred." And I said, "You guys told me to go find a job if I didn't want to count paper." And I said, "I found one and they transferred me in four hours. It's not my fault." And so, I went over and I've been with expendable vehicles ever since.

Buckingham: Ok. Let's stop there for a second. We're going to turn, stop the tape and turn it over.

Johanson: Sure.

Buckingham: ...picking up our interview with Roy Johanson. And we've got to cover your career, just a couple of key questions or general questions.

642

643 Johanson: Ok.

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645 Buckingham: As you look back over your career, what are two or three of the key people
646 who made a difference in your career and why they make a difference in your career?
647 People who either challenged you…

648

649 Johanson: I don't know if I can say individuals, but the opportunity to work on the
650 Apollo launch team and that firing room is something that you had to be part of to
651 understand. It was such a close-knit family that everybody felt like everybody else, and
652 most often, you know, you'd find guys turning around and answering a question before it
653 was asked, knowing that that's what the guy next to you was thinking. You know, it was
654 that close of an organization. The only other, and then, fortunately, on the Atlas-Centaur
655 team, when I was out in the block house. Same way. You couldn't tell NASA from
656 contractor. If the badges were wrong you could not tell the difference. Who made a
657 difference? Let me think. I think it's just a lot of the people that I met. Over the years, I
658 have also worked for public affairs and I've been able to escort some very big visitors out
659 here. Alan Shepard was one of the guests I was with once. And Dr. J. R. Maxfield – he
660 used to come here for all the launches until he got too old to be able to come out. And
661 they used to bring some very influential people. And I think, probably, what's influenced
662 me the most is going around and telling people, like what I'm telling you today, and
663 seeing the light in their faces. And I didn't know that. You know, you know we, while
664 you're doing that… One of the most exciting times I had is in 1986… I had the

opportunity, Atlantis was down for a problem at the time with liquid hydrogen leakage. And the Center was very down. Everybody was in the doldrums. And I went to a Space Congress, I mean to a Star Trek convention in Orlando, and I had gotten permission from Bob Crippen to invite Jimmy Duen over to tour the Center. And so, I invited him and he accepted. And I brought him over here on what we used to call the gold badge tour, Center Director's tour. And I took off from work to escort him. And escorted him around the Center and we spent about 12 hours out here that day. And when he walked through the Payload Bay and the orbiters were sitting there… boy, the bay just lit up. All the people just lit up. And we had a great time. And then the next year was the 20th anniversary of Star Trek. And Jimmy Duen and George Dukai and Michelle Nicholas, all three came back out. And the thing that impressed me the most, two things; first off I asked Jimmy the second (???) because he had typed… he had taped, videotaped, everything we went to see. You know, they let him up, the contractor asked if they could take him up into the orbiter. And we let him go up and he got to sit in the commander's chair up on the flight deck and everything. Of course, in a bunny suit, he's kind of like me, kind of rolled like a Pillsbury dough boy, you know. But, he had a great time and he told me, he says whenever he goes on Star Trek conventions, especially overseas, he would show that tape to people. And he says they were just awed at the immense size and the capabilities that we had out here. The second chair, when I took George and Michelle and Jimmy around, we didn't have as much time. But when George came out here this morning – that morning – he told me right off the bat, he said, "You know I'm not a big proponent of the Space Program. I think we can use this money elsewhere."

And the last thing he told me before they left that day is, he came over and he grabbed me by the shoulder and he said, "Roy." He said, "I've changed my mind."

Buckingham: That's great. It does make a difference.

Johanson: Things like that make a difference.

Buckingham: When you get down here and see it.

Johanson: Yeah.

Buckingham: Well, as we look to the future, we've got the President of the United States made his announcement. What would you like to see? Or what do you think of that vision as far as going…

Johanson: I think it's a good vision. What I think is going to ultimately happen, I may be way off, but now that we have Atlas 5 and Delta IV coming down the pikes, Atlas at one time a (???) vehicle. There is an attempt to (???) Atlas again, and Delta IV as well, to launch a small version of the Shuttle, a space plane, so to speak. They're changing the name of it so it's not called Space Plane anymore, but something of that nature on top of those vehicles. They're cheaper to launch. We could probably launch one of those for a third of the cost of launching the Shuttle. And I really think they are going to become the mainstays of the program, especially getting the supplies, and possibly men ultimately,

up to the Space Station. I think the Space Station is very important. It's going to be, it's still going to be one of the best take-offs, or platforms we have, for launching either to the Moon or to Mars. If you go build a vehicle on the Moon, you still have to break the gravity of the Moon to get out there. If you go to the Space Station, you are already above 99 percent of the gravity. So, if you can assemble a vehicle in orbit, next to, or near the Space Station, I don't think you'd need near as big a vehicle to get to Mars as you would from a ground launch. So, I still have a lot of hope for the program. And I'm excited about it. I just, but I've been, I've been here since the heyday of the beginning of the manned program and it's time for me to turn it over to the youngsters and their new ideas.

Buckingham: OK.

Johanson: And see if they can bring them to fruit.

Buckingham: OK. And last question is: What advice or insight would you like to impart to those young workers or the next generation of KSC employees?

Johanson: Well, don't give up the dream. You know, that's the biggie. Don't give up the dream and don't become to lax because launching the space stuff that we're, launching the vehicle we're launching now, and not just the manned but the unmanned launches… quite honestly, it's become everyday to most people. One of the things the youngsters have not had a chance to see, which I can appreciate, is that I was still here

when you pushed a button and you had about a 50/50 chance of that thing going about 100 feet and blowing all to pieces. And then having to go up and figure out what went wrong. That builds an appreciation for you that, unfortunately, they don't have today, because very few of them have ever seen things go really bad wrong. About the only other thing that I would pass on to our management, given the opportunity, was I really think we need to do more in the field of quality. When I was growing up, I had a full force of quality inspectors, NASA quality inspectors, not contractor, that would notify me as the engineer if they didn't like something on the pad. And I'd go down and look at it and either agree or disagree – they didn't care if I agreed or disagreed. They were kind of my extra eyes and ears of things going wrong on the pad. Unfortunately, in the last five years, they have done away with all those inspectors. They have moved more towards the Shea, what we call the Shea side of the house - the "assurity analysis." And although that is extremely important, I think the hands-on inspector is also very important. And if there's one thing I could change today, we're starting to get a real good class of engineers, but I would go out and hire some good, quality people. Now they can be engineers, but they are going to be engineers that are willing to get down in the mud and get dirty. It's that simple. Quality is not a job to sit up in your office, nice, clean, white shirt and tie and not get dirty. You've got to be down there with the guys in the cold and the heat, the wind and the rain, and watch what they're doing. And then, if you have a question about it, ask.

Buckingham: Ok.

Johanson: So that they can fix it.

Buckingham: Roy, I thank you for your time today and I wish you good luck as you are. And just a note, I should've mentioned it at the beginning, that Roy's wife is sitting with us during the interview. And I so I wish both of you the best of luck as you move on to the next phase.

Johanson: Thank you very much.