

NASA HEADQUARTERS ORAL HISTORY PROJECT

EDITED ORAL HISTORY TRANSCRIPT

ALAN M. LOVELACE
INTERVIEWED BY SANDRA JOHNSON
MERRITT ISLAND, FLORIDA – JULY 14, 2011

JOHNSON: Today is July 14, 2011. This interview is being conducted with Alan Lovelace in Merritt Island, Florida, for the NASA Headquarters Oral History Project. The interviewer is Sandra Johnson, assisted by Rebecca Wright.

I want to thank you for joining us today and agreeing to talk with us. I want to talk about the beginning of your career and your interest in chemistry and how that led you to your work with the Air Force.

LOVELACE: I guess my interest in chemistry started in high school. Shows you the impact of what one good teacher can do in terms of careers. When I went to the University of Florida [Gainesville, Florida], I studied chemistry, and took my three degrees from Florida, my bachelor's, master's, and Ph.D. in chemistry. I went to work for DuPont in Kinston, North Carolina at the Textile Fibers Department.

I was in an Air Force ROTC [Reserve Officers Training Corps] when I was going through college, and I was commissioned as a second lieutenant, and I got called to active duty from DuPont in—I think it would be 1954—and assigned to Wright-Patterson Air Force Base in Ohio and assigned to the Materials Laboratory, which had a Polymer Branch, where I spent a good deal of time. This is during what was then known as the Korean Conflict, later turned into the Korean War, and I served my two years.

In the course of my Air Force career, which I will try to truncate in the interest of interest, I was eventually the Director of the Materials Laboratory and then moved from there to Systems Command to be head of all the laboratories for the command, and from there to the Pentagon [Arlington, Virginia] as Deputy Assistant Secretary for the Air Force for R&D [Research and Development]. Then from there I went to NASA as the Technology Associate Administrator for OAST, [Office of] Aeronautics and Space Technology, and from there to Deputy Administrator of NASA. That sort of encapsulates my career up to that point.

JOHNSON: While you were in the Air Force, I know one of the things you were working on early on, lightweight composites and how those could be used, and there was some discussion on early concepts of reusable winged vehicles for space in the Air Force. Did you have any involvement in that?

LOVELACE: To come back to that question, obviously materials are a primary technology for most applications, and so much of the technology that was developed through the Air Force programs got used in Air Force vehicles as well as in some of NASA's vehicles, including the [Space] Shuttle. But we were not involved in the direct design of the vehicles or their testing. We were rather, I guess you'd say, consultants about the choice of materials.

JOHNSON: Do you remember any of those discussions about the Manned Orbiting Lab with the Air Force or talking about any of that at the beginning?

LOVELACE: No, I really don't. Nothing comes to mind in the specific that would be, I think, of interest and use.

JOHNSON: Let's talk about when you moved to the Associate Administrator position with NASA in 1974 in the Office of Aeronautics and Space Technology. If you can, just talk about that position and what that involved and some of the things you were working on at that point.

LOVELACE: The Deputy Administrator was in charge of, if you will, managing through the Centers, not directly out of NASA Headquarters [Washington, DC], but through the Centers the science and technology programs of the agency, which were in various technologies, not just in materials but in propulsion, avionics and other technologies. That was the responsibility of that Deputy Administrator to manage that spectrum of activities called science and technology.

JOHNSON: Did you have a lot of interface with the other Centers? You managed all the Centers. Did you visit those Centers?

LOVELACE: Oh, yes, sure, a lot. Johnson Space Center [JSC, Houston, Texas] was never considered to be at that time a research and technology center. Those Centers were principally Langley [Research Center, Hampton, Virginia] and Lewis [Research Center, now Glenn Research Center, Cleveland, Ohio]. It was [Glenn]. The Jet Propulsion Laboratory [Pasadena, California], which was, of course, under contract to NASA, and Ames [Research Center, Moffett Field, California] were nominally the research and technology Centers. By saying that, they were the ones who spent most of the monies that have been allocated to the science and

technology program. Not that there wasn't a lot of technology being developed at the other Centers, but if you want to make the fine distinction between more fundamental and applied, the work at Marshall [Space Flight Center, Huntsville, Alabama] and at JSC was much more applied technology.

JOHNSON: During that time period there was also those early discussions in the Space Shuttle Program. Apollo had ended and the Space Shuttle Program was being discussed as far as the design and the development. Since part of your job was the advances that were required for this aircraft and for space travel, what are your memories of those early days during that time period, when you were in that position, of the Shuttle development?

LOVELACE: When I was in the Materials Laboratory, we worked very closely with, I remember, Marshall Space Flight Center, and Bill [William R.] Lucas. In fact, Bill was a chemist too. He was a materials technologist, so we used to work fairly close together. Particularly we were interested in and promoting advanced composite technology, which eventually has found a lot of applications in aircraft and space programs. So there was that cross-talk.

As you well know, there are various societies, AIAA [American Institute of Aeronautics and Astronautics] being one that I know you're familiar with or have heard of, and there are other such professional societies which causes people to come together and exchange ideas and communicate progress. Just as a parenthetical observation, it's one of their major strengths of the United States versus Europe, which the Europeans have in the past—they're better today—but they have in the past been very insular in their individual countries and not a lot of cross-talk, which I think tends to slow down their development activities. The United States is a much more

open society both technically and socially, I guess, and that works, I think, to the advantage of the developments that are taking place in the United States.

JOHNSON: When you decided to leave the Air Force in '74 and take this position, what led to that decision and how did you make that move?

LOVELACE: Well, probably two things. One, I found as one moves up in the government, as you know, things become less technical and more political, and I found the position in the Pentagon to be more political than I enjoyed. I enjoyed the science and technology aspects much more so. So it seemed like an opportunity for me to move backwards, back into areas I was much more familiar with and enjoyed, and I think you do the best jobs in the ones you enjoy doing.

I'm not sure I want to see this in an open record, but my then wife wasn't terribly—she never got totally comfortable with my being in the Air Force. She was never totally comfortable with that. She was much more comfortable contemplating NASA, which, as you know, portrayed much more of a civil and an open environment. I guess that was a contributing factor for me to make that decision, so I ended up moving over to NASA to the Associate Administrator's position.

JOHNSON: Did that position allow you to enjoy your job more than you had? Was it what you thought it was going to be?

LOVELACE: Oh, yes, and it interfaced with a bunch of bright technical people and much more at a technology and a technical level. Not that there aren't politics involved. By politics, I mean

you have to defend budgets; you have to get your funding from Congress. That takes some level of political astuteness to do that. But there was a lot more content, technical content to the position at NASA than there was in the position I left in the Air Force.

JOHNSON: Were you involved in trying to get the funding for your area?

LOVELACE: Yes. You are the person who's responsible for every year designing the program or redesigning it or redirecting it, depending on what the requirements are, of laying out the funding requirements for it and defending it within NASA proper, which is to say with the Administrator of NASA and with the other Associate Administrators who were doing the same thing for their areas. Out of that comes finally the budget for the agency, for NASA as an agency, up to being called up to Congress maybe when there were questions about your particular area. So there's a good deal of political activity. You had to be reasonably politically astute, but I think the work in the Deputy Administrator's position had a much higher technical content, and for that reason for me was a fun time.

JOHNSON: The Administrator at the time was James [C.] Fletcher.

LOVELACE: Right.

JOHNSON: What was your relationship like with him?

LOVELACE: It was good. He's since passed away, of course, but he was one of the people that I really had a great deal of respect for. I'll tell you a vignette. I was a representative to the NATO [North Atlantic Treaty Organization] AGARD Committee. AGARD is the Advisory Group for [Aerospace] Research and Development for NATO. I happened to be in a meeting in London [England] when Jim Fletcher called, and he said, "Just called to let you know that George [M.] Low is leaving the agency. He's going up to be president of Rensselaer Polytech [Institute, Troy, New York], and I want you, if you would, to think about who might be a replacement for him, and when you get back, we'll talk about it."

So I made a list of potential candidates, and I got back and sat down with Jim. He said "Well, you've got a good list there, except for one name."

I said, "Who's that?"

He said, "Yours. You don't have your name on the list."

I said, "Well, I'm not promoting myself. I think these people are fully capable."

Long story short, he said, "I want you to consider taking that position," and that's how I moved from Assistant Administrator to Deputy Administrator, which is one of the two, as you know, political appointments in the agency that are in the so-called Plum Book [United States Government Policy and Supporting Positions], which has, or used to have, I don't know, 1,600 or so names in it. These are the positions that any new administration coming in can appoint and in some respects pay off some of their political baggage by appointing people to these various positions. That requires a [US] Senate confirmation. You've got to go through all that sheep dip. And that's how I ended up as Deputy Administrator under Jim Fletcher, who I found, as I say, to be just a great guy to work with and work for.

JOHNSON: Could you talk about that Senate confirmation for a minute?

LOVELACE: It was pretty much a love-in. At least that's my perception of it. Things have changed quite a little bit, I think, in relationship between NASA and Congress in recent years. It used to be much more of a—not a love-in, but much more of a healthy relationship. I think Jim Fletcher carried a lot of weight with the committees, and they were hardly, I think, going to face him down against an appointment that he wanted. The committees were very easy to work with, and I think a lot of that's been lost in recent years, months. But it was good then and it went fairly smoothly, and I don't remember them asking any embarrassing questions about my life, so it went right by me.

JOHNSON: And you took that position. Can you talk about those first few months before Jim Fletcher left and before that period, and what you were working on? Again, there were talks, I know, during that time period with the Air Force and between NASA and the Air Force and the development of the Shuttle.

LOVELACE: Sure. Well, for me, there was a bit of a steep learning curve, you can imagine. There's a lot I had to catch up with in that new position. Of course, the Shuttle Program was moving along at that stage. The Secretary of the Air Force, Hans [M.] Mark, and I were, I guess you'd say, friends and certainly professional colleagues. He had been the Administrator of Ames for a while.

I knew Hans' father before I knew Hans, because Herman [F.] Mark, his father, was a consultant to DuPont, and I had met him when I was with DuPont. So it's a small world when

you get right down to it. Hans was Secretary of the Air Force, and so Hans and I worked together to make sure that the Shuttle could accommodate Air Force payloads and vice versa through that period, and that was, I think, a useful environment and a busy one.

JOHNSON: In 1977 after Fletcher left, you became the Acting Administrator for a little over a month. Do you have any memories during that time of anything significant that happened?

LOVELACE: Well, let's see. Yes. As you know, political appointees, as I mentioned earlier, the one thing you do with a change of administration is everybody is supposed to submit their resignation and it's signed but undated, and it's to allow the incoming administration to say, "Well, we appreciate your services, but we want to replace you with somebody." So we all went through that, and they appointed—and Jim Fletcher was a pretty dyed-in-the-wool Republican, and when it was clear which way the election had gone, he was out of there. He didn't stay around long. So I just sort of hung in there, trying to hold things together until the new administration selected Bob [Robert A.] Frosch. Bob came in.

That transition went fairly smoothly, and Bob Frosch and I sat down. I said, "Bob, I serve at your pleasure, and there's no wrong answer. If you want to, and I could perfectly understand, bring in somebody, I'm going to exit stage left and there'll be no problem."

He said, "No, I want you to stay on, and I want you to worry about Mr. Inside. You worry about the programs, and I'll worry about Mr. Outside and the Congress and the administration." So that was, if you will, nominally a division of responsibilities between Bob Frosch and I. Bob was a very easy chap to work with and very intelligent, in my perception, and so we got off to a very good start there.

JOHNSON: And you were happy with that decision to worry about the inside and not have to worry about the more political side of the job?

LOVELACE: Yes. The inside at that time was a lot of the technology stuff, but also the Shuttle Program was coming along, and it was not too long after that that I used to have to go over with Jim Fletcher with Bob Frosch and testify before Congress. They always want to know, “When are we going to launch the Shuttle?”

“Well, soon. Don’t worry. We will. It’ll happen,” blah, blah, blah, blah. So it got old, you know. You can only do that a certain number of times and your credibility is seriously in question, I think.

So I called the Center Directors, and I said, “Look. We’re going to have a meeting, and I want you to bring an extra white shirt, because we’re going to stay here until we can pick and commit to a launch date, because I can’t keep going over to Congress and seeking support unless we’ve got a plan.”

To their credit, Chris [Christopher C. Kraft, Jr.] and Bill Lucas and the whole crowd came in together and spent probably three days. I said, “Let me tell you how to think about this. You’ve got to think about ham and eggs. The chicken is involved with the egg, but the pig was committed to the ham. And we have to be committed to a launch date. We’re involved, there’s no question we’re all involved, but are we committed?” So I said, “You guys hash on it, hash it out. Let’s pick a date,” and they did. In fact, picked the date in 1981, April of ’81, nearly two years before the first launch, and made it happen, not my credit but to their credit. We would

have made the exact date, but we got two-day delay because we had a computer software glitch. There was a problem with the computers handing off on the Shuttle.

Guys out of Johnson ran the simulator day and night there for about two days and figured out what was wrong, and it was a relatively easy software fix, and so we went on to the launch, as you know well. That was really the beginning of the Ham and Eggs Society. It says something, too, I think to the need and desirability to set a goal, and then, of course, set out to achieve that goal.

The thing I'm not too happy about the agency right now is I don't know what their goal is, and I think without setting one, unless it's to put the agency out of business, which could be a goal, I guess. Even [President John F.] Kennedy set a goal of landing on the Moon, and I think that had a great stimulating influence on the agency's ability to bring together the correct technologies and hammer out the Apollo Program. So we need to do the same thing today with the NASA Program, but that's another issue.

So the Ham and Eggs Society set the date and would have made it except for that little software glitch, and we went on from there. It was a lot of fun adventures doing all that.

JOHNSON: During that time and before the launch, and again the Air Force and NASA were in discussions about one of the things that the Air Force wanted, which was assured access to space so that in the interest of national security they would have the ability to bump payloads if they needed to get something into space. Can you talk about some of those negotiations with Hans Mark?

LOVELACE: Let's see. This is where you have to be very careful about, I think, what we actually publish, because it is always a win-lose sort of thing, and I don't want the Air Force to think or take the wrong conclusion, but understand that the Air Force, and I guess I should say not just the Air Force, but the Army and Navy, they send their officers to school, to Command and Staff School. They're supposed to command something. And it's very difficult, I think, for them to not be in charge of running the Shuttle and commanding it.

There was a lot of discussions involving Hans and DDR&E [Department of Defense Research and Engineering]. Anyway, there was a lot of discussions about the importance of the missions that they had, and it was pretty much agreed if we were in a national crisis basis, that they would have priority and be allowed to, if you will, preempt other launches that were in a sequence. And that never was a problem. Well, it still isn't. I don't think it's a problem.

JOHNSON: Also, the Air Force was going to be building facilities in California.

LOVELACE: Did. Put a lot of money into it, and Hans was in charge of that part of it, and they put a lot of money into it. Of course, later on, this unraveled, as you are aware, and there never was a launch out of the West Coast facility, which I don't know whether that's good or bad, but it's a fact.

I'd have to say Hans played a very important and pivotal role in keeping the Air Force onboard during these early and tough times, because they had to spend a lot of their monies, appropriations, to build a launch complex out on the West Coast, and they had to do some alteration of some of their payloads to accommodate to the payload-bay dimensions. I'm trying to remember, but I don't remember that weight requirements were so significant as they were

concerned about the actual physical width and length of the payloads that had to go into the payload bay. And again, Hans was very instrumental in bringing that along.

JOHNSON: When [President] Jimmy [James E.] Carter, his administration came in—and you mentioned it a little bit in some of the changes that were happening—one of the things he said in '78 was, “Our space policy will become more evolutionary rather than centering around a single massive engineering feat,” and at one point he even considered terminating the Space Shuttle Program in '79 and, because of national security reasons decided not to, and he approved four Shuttles instead of the five that NASA wanted. Do you have any thoughts on that period?

LOVELACE: I never really felt that Jimmy Carter was totally committed to the space program, as reflected in some of the statements that he made and policy statements that he made, but I have to say that in the final analysis it came out all right, and part of it was that it was not just a NASA program, but it was a US program involving Department of Defense and NASA, and some of the activities that had preceded that, which we mentioned earlier about sizing payloads. Many of those payloads were sensitive payloads involved in the reconnaissance arena. Just leave it at that. I think that had a tendency to cause the Carter administration to not push totally to cancel the program.

I think toward the end of his administration, Jimmy Carter got to be more supportive, having come down to KSC [Kennedy Space Center, Florida] down here and elsewhere, I think, and seeing what was going on, I think he became much more supportive of the program.

Transition from his administration into the [President Ronald W.] Reagan administration was kind of interesting. The incoming administration usually puts together a transition team in

various areas, like NASA and the Department of Defense, the State Department, who works with those agencies to transition into a new administration. I got the pleasure of meeting some very intelligent, bright guys who were the transition team members for Ronald Reagan, and they came over and drank all my coffee, and sat around. I finally had to say, "Look. I'm fairly busy. We're trying to get the Shuttle Program focused on a first launch, and I don't mind meeting with you. You're very nice folks, but we've got to stop meeting like this."

I had to tell them that we were getting ready to launch in six months. This was obviously pretty close to the target date we had to launch, and we were fairly busy. And I said, "You go back and talk to your betters, whoever they may be. You're in a win-win situation. You can ask me to leave, no problem, and you guys can launch. I think it'll be successful, and you can take credit for it. You can say, 'You can see what the Republicans did, and we did it all in four months.' If it's a failure, you can say, 'See what we did? We threw out those guys who caused that failure.' So it's win-win for you. But you've got to decide who you want in here and then let's quit talking about transition and let's get on with the launch. I plan to leave after the first launch, so you don't have to fire me or anything. You've got my resignation in hand."

They went away and came back and said, "Oh, it's all right. Stay. Hang in there." Because Bob Frosch had left, too, as soon as elections were clear that Ronald Reagan was in, and he went back up to Massachusetts, and I was sort of the Acting Administrator and the Deputy Administrator for about six months there until about six months after the first launch, which was, as you know, reasonably successful.

JOHNSON: Since this is the second time you were Acting Administrator during that time, was there any differentiation as far as what you were allowed to do as Acting compared to what the actual Administrator was allowed to do? Did you have the same ability to make things happen?

LOVELACE: Yes. I don't think there were any constraints on them. Let's say the Reagan administration was acutely interested, as they should have been, in the launch, first launch. So you had to set up a communication channel without calling the President every half an hour and saying, "Well, we're on track," or, "We're off track" or whatever, which Bob Frosch would have normally done if he were there, because he had the outside contact pattern. I had to pick that up, which was not difficult but necessary, to know who Reagan's office or administration wanted to have advised of the status of the Shuttle launch, and we did that and it worked out all right. I felt no impediments to getting the job done.

JOHNSON: There were, as you mentioned earlier, a number of delays before that launch date was set, as far as technical problems, cost overruns. Can you talk about some of those discussions about the cost?

LOVELACE: Well, it sounds easy, but it is not easy to estimate the cost of an R&D project, and particularly a development as advanced as the Shuttle Program was and is.

I'll give you one example. I went out to Marshall. At some point we decided we had to run the Shuttle main engines up to 104 percent to achieve the initial orbital velocity or escape velocity, I guess it is, and so I went out to Marshall one time for one of the first tests of the engines, the 104 percent engines. J.R. [James R.] Thompson, who was the manager for that part

of the program, and I were hunkered down in the bunker there, and they started it up and it blew up, just tremendous explosion. I thought, “Well, there goes the launch date.”

We walked out in this big flame trench out there. It was scattered with hardware all over the place from the engines. J.R. and I walked out there, and he reached down and picked up a piece of hardware and looked at it, and he said, “Well, there’s the problem.” He said, “That valve was clocked wrong.” I thought, “That’s the fastest failure analysis I’d ever been involved in.” I think he was right.

I think we went on to a series of tests after that, successful ones, one after another. Even today I always worry a little bit when they say, “Throttle up,” on the Shuttle launch, but it went well.

The other vignette of—I came to KSC working on the thermal protection system, and I don’t know how many thousand tiles. I used to know. Each one’s unique in its geometry. I came down there and they had cornered the market on three-by-five cards. They had a card for every tile. I said, “This is kind of embarrassing.”

They said, “What’s embarrassing?”

I said, “Here we are, high technology. Why don’t we get a computer and put this all on a computer?”

“Oh, yeah, there’s a good idea.”

So I came back some months later, and I said, “Come on. We want to show you what we call Al’s Dial-A-Tile.” You get in there, you could dial up a tile, and it would tell you the history of it, because you had to keep track. A lot of them were repaired and reworked and whatnot. So that was Al’s Dial-A-Tile.

Those were probably two of the leading technologies for Shuttle. Interestingly enough, we never really thought that the solid strap-ons were of much concern at all, and, of course, we had an unfortunate failure later on. But, not because it wasn't engineered right, because I think we violated our own ground rules for launch in terms of temperature requirements, so it bit us. But the solid strap-ons were never considered to be a major worry. Shuttle main engines, thermal protection system, another matter.

So that gives you some idea of the things that were going on leading up to the first launch.

JOHNSON: Did you visit most of the Centers in the areas that were working on the Shuttle during that time period?

LOVELACE: Oh, yes. Johnson and Marshall were two, KSC, of course, where the launch complex is, the three Centers that were really the major contributors, not that the other Centers were not in support. Even Langley was supporting the thermal protection assessments, but the three major technology Centers would have been Johnson, Marshall, and KSC.

I visited so much down here, I finally ended up buying a condominium because I was tired of hotels, it gets old.

JOHNSON: What was the atmosphere like at these Centers when you visited them, as far as people working toward this goal of getting this launch in '81?

LOVELACE: I think it was outstanding, and I think they demonstrated it by actually delivering.

All the astronaut training, of course, was done at Johnson.

You never can take an event like the first launch of something as advanced as the Shuttle was and reduce the risk to zero, there's just no way you can do that. We just don't have the test equipment here on Earth to do the testing that will assure you absolutely that your thermal protection system is going to work. So you work the best you know how, and you keep reducing the risk and reduce the risk until it's, if you will, acceptable risk. Well, acceptable to whom? To me, it had to be acceptable to [John W.] Young and [Robert L.] Crippen, who were the astronauts to take the first ride on the Shuttle. They had an open invitation to attend any of the technical sessions, so that they could develop their own sense of confidence or lack of confidence by listening to the "experts" discuss what they knew and what they didn't know.

I think that was very helpful and has led me to really believe that—let me say that I love all the astronauts, but I have a short list of hero astronauts, and John Young and Bob Crippen are on that short list. There are some Apollo astronauts that are on it, too, because they took a lot of risk and I think disported themselves with great grace and dignity, to say nothing of success. So they go down in my book as, well, hero astronauts. Not that there aren't a lot of astronauts. I guess there's a lot of them now wondering what they're going to do with the rest of their lives, but they're all bright, capable people.

JOHNSON: It was the first time that America had launched a test vehicle with astronauts onboard.

LOVELACE: Yes. Even the first launch of John [H.] Glenn, who was on an Atlas [rocket], the Atlas had been flown and flown and flown, and I've a plaque in here that's the 500th launch of an

Atlas. There was a long history of launching Atlases. A lot of it was in the ICBM [Intercontinental Ballistic Missile] era, but then later on it was as a launch vehicle for payloads in space. But this is really a lot of unknown in the Shuttle Program.

There was a big data package onboard the first launch, collecting data, which ultimately led to—because today's launch and the one that was launched last Friday wasn't your father's Oldsmobile, you know. It was quite a different vehicle, a lot of improvements have been made, and lessons learned and data collected, which we didn't have for the first launch. We got a lot of background data, and that's, of course, how progress gets made.

JOHNSON: The *Columbia* orbiter was rolled out in Palmdale [California] in March of '79. Did you see it then?

LOVELACE: No, I didn't. I didn't see it till it was down at KSC down here, and they didn't even have the Orbiter [Processing Facility] built. That came later in the program. They had the dual prep building when I saw it. I guess it was in the Vertical Assembly Building the first time I saw it, and, of course, it looked new. Now they're a little ragged around the edge, showing a little wear and tear, which is good.

JOHNSON: What did you think the first time you saw it?

LOVELACE: Well, I was a little scared. I guess I have to say it was from that that I developed such a great respect for John Young and Bob Crippen, because I'd been up the tower out there

and I've crossed over and into the cockpit of the Orbiter, and just sitting on top of that thing is a sobering thought, and yet they did it with what I call cool precision.

JOHNSON: In some of those negotiations, and with Congress, you said they kept wanting a date, wanting a date, and I'm sure the cost was an issue too. Were you able to convey some of those feelings that you had to them during those negotiations?

LOVELACE: Yes, I think so, and I think I have to say the Congress was still very supportive, and as it became clear, particularly after first launch, that we had a success on our hands, albeit we had a lot of improvements that could be made, I think the Congress was very supportive.

I sense—and I'm not obviously in Washington doing it today—but I sense that we've lost some of that confidence that Congress always felt about NASA. When they came over and said something to them, they just took it at face value and there was never—there seems to be a lot of dancing around today about, “Well, what are you going to do?” “Well, I can't tell you today, but maybe tomorrow. I don't know.”

“That is not confidence-building, so I think we'll pass.” But what will be afterwards, I'm not sure. We'll have to find out.

The Congress was good, was really very supportive, and we had massive overruns. You just don't bring a program off like that and make a prediction eight, nine years in advance what the total cost is going to be. You can't predict what the problems are going to be very well, much less what it's going to cost to fix them. So it went well. I think it was a good investment on the part of the country.

Something that I was struck by this last launch [STS-135], the number of people who came out and why. Why do they come out? It's a fair question. Oh, yes, it's a launch, but we've had 135 launches. I think there's a bit of national pride wrapped around this, which I think we will have to replace with something, and I don't know what that is. But we're going to have to replace it with something, and I think the country needs to feel like they're living in a first-rate country with high technology and that sets tough goals and meets them. Maybe that will happen.

JOHNSON: Do you think NASA has some responsibility as far as the public perception? Of course, we have Public Affairs [Office] that takes care of that. Do you think that during that time of the Shuttle buildup that we were able to get the rest of the country behind it?

LOVELACE: I don't know what NASA does today, but I know what we did. I don't know quite how to express it, but I don't think I ever felt like that program was my program, but it was the country's program, and they needed to know as much as we had time to share with them about the program. Most of us, I know Jim Fletcher and Bob Frosch and I, and George Low before that, used to spend a lot of time talking to various groups around the country, from schoolchildren to business groups to whatever, about NASA and about the program and where it stands, so they felt some ownership. I'm not sure what we feel today. We don't know what there is to own. What is there to own? Well, heavy-lift launch vehicle. Yeah. What is that? Who knows? I don't know. I'm a little bit at sea at the moment, as I think a lot of people are, about what we can pin our hat on for the next generation. We'll see.

JOHNSON: Before that launch, they had the approach and landing tests out at Edwards.

LOVELACE: Oh, yes.

JOHNSON: Did you see any of those, or what are your memories of that?

LOVELACE: Oh, yes. Well, it's an interesting—see, you're talking to a technocrat, so the things that might interest me, you'd say, "Oh, come on."

JOHNSON: No, we want to hear what interests you.

LOVELACE: Well, it was interesting to me to find out. As you know, we did the drop test from the 747, and it was always interesting to me that the Shuttle Orbiter actually dropped the 747, because the Shuttle Orbiter generated so much lift that as they powered back the 747, the 747 dropped. I thought that maybe that vehicle will fly back, and, of course, they flew it back several times onto Edwards [Air Force Base, California]. It was an interesting thing.

I remember after the first launch down here, Susie Young, John's wife, was obviously concerned about the event upcoming, and we commiserated some about it. After the launch and the landing, they were getting ready to land out at Edwards, and I flew out to Edwards for the landing. I remember walking out on the hard stand above one of the hangars there, and I hear this voice saying, "Al! Al!" And there's Susie Young. Oh, she was so happy that they had landed safely. They hadn't even gotten out of the Orbiter yet, because they were hooking up the cooling towers. But she was so happy, and I can remember that.

I went from there back to Johnson, where the crew went back there, and we had rented a plane. Turns out it was John Denver's [singer/song writer] plane. John was a great space supporter, as I'm sure you know. We got onboard, Kathie and I, my wife then, and there's this bucket of ice with a bottle of champagne in it that says, "From John. Congratulations." So it turned out well.

I stayed on with the agency until July [1981]. I went overseas with John and Susie and Bob Crippen went over, I think, with his wife. We visited some different countries and people who wanted to meet an astronaut, so we went to Spain, for example. But that was all sort of powering down and my trying to exit stage left. Jim came in to replace me, or replace Frosch, actually.

JOHNSON: Jim [James M.] Beggs.

LOVELACE: Jim Beggs. Jim was in General Dynamics. Jim had a position at General Dynamics, and I joined General Dynamics after he left as Vice President for Science and Technology and went on out to set up the Space Systems Division in San Diego [California] and to commercialize the Atlas as a launch vehicle, which it still is being used as such. So, small world, small community. That's pretty much the life story of yours truly.

JOHNSON: Talk about the launch real quick for STS-1. In Hans Mark's book, he quoted you as saying, "We're number one again," when the launch went off.

LOVELACE: Yes.

JOHNSON: Can you talk about that day?

LOVELACE: Well, you get carried away. You know how it is. But let me tell you, it doesn't matter how much you know, but when, as you've seen these launches, you know, it goes up and then it translates, turns, so that the Orbiter is really underneath and the external tanks up top. I thought when that thing started to rotate, I forgot it was supposed to do that, and I thought, "Oh, my god, what's it doing?" Then I thought, "Oh, that's right. It's supposed to do that."

It was a good time and I really felt most proud of all the people, and I mean not just the NASA people, because there were an awful lot of industry people that contributed in many, many ways, but I was really proud for them. I had a few thoughts about what if it fails. I'm not a pessimist, but you have to think about how will you disport yourself if, in fact, it turns out not to be a success or successful as you might hope it would be. But that was all a waste of time. Somebody said, "Every bit of worrying is a waste of imagination." So I wasted some imagination, I guess, worrying about that, but, fortunately, I didn't have to.

JOHNSON: It was a good moment, I'm sure, watching that first one go off.

LOVELACE: Oh, yes, it really was. We'd gone a long time without any major successes in the space program, although some of the science activities had gone on. I remember the Viking Landers, which I found to be very, very interesting, but aren't quite the eye-catcher that flying people in space is. There's no question that you need to put people there to really get the attention of the public, certainly.

JOHNSON: One of the things that I wanted to talk about before we got off of that time period was in July of '79, we were talking about people's perceptions of NASA, and Skylab reentered the Earth's atmosphere.

LOVELACE: Yes. Right.

JOHNSON: There was some worry and fear going around. Do you have any memories of that period and any stories about that time period and that experience?

LOVELACE: I kind of got tagged with worrying about what we do about Skylab. We looked at all the options. There were really three major options. One of them is don't do anything. The other one is boost it up into higher orbit. The other was boost it down into the ocean.

After much discussion, we decided to leave it alone, and principally because we didn't have a way to really boost it up with any accuracy, nor were we very confident about boosting it down. I thought if we boosted that thing down into the Orange Bowl when the game was on, there would be no tomorrow. So we decided we'd just let Mother Nature take its course, and, as you know, it did impact in the western Pacific in the western part of Australia, scattered some hardware in there, but nobody was hurt, so I thought, "Home free."

Then shortly thereafter, I get this call from the Australian Embassy. Their science and technology guy was going to be in town, and he wondered if he could meet with me. I thought, "Uh-oh. Now I'm going to hear about that Skylab." So I said, "I'll be over."

I went over there, and a very nice chap. He said, “Say, old chap, you wouldn’t have another one of those you could drop on us, do you?”

I thought, “This guy—.”

He said, “You can’t imagine how much that’s improved tourism in Western Australia. Everybody out there who got a few pieces of hardware set up a museum and charged money for people to come in and look at the pieces.”

In fact, we had set out to collect all this and bring it back to the United States, because legally, I guess, we had the right to do that, but we stopped doing it. It turned out not to be politically astute, because these people were really—it was a cottage industry. There were several museums set up over there.

I told that chap, I said, “I don’t have another one, and if I did, I wouldn’t want to be worried about it again. I’ve lost enough sleep over this one.”

But it’s what it was, and it was interesting, too, that we had to make sure we had a communication system around the world, because we didn’t know where it was going to come in. I learned something in that process, and that is that the civil aviation authorities have the best worldwide communication system that I know of, better than NASA has. We talked with the chaps over there, and they were reluctant, but they agreed that we could in fact use their system to make sure we could communicate back, depending on wherever it went, because there’s always a commercial airport closer, and they’re all very well linked up. I don’t know why I never thought about that before, but it sort of was news to me. It worked well. But no more Skylabs, please.

JOHNSON: During your time there—and we were just looking at the photo—you won some awards. One of them was the Citizens Medal.

LOVELACE: There's a Presidential Citizens Medal, which I accepted on behalf of about 35,000 other people that made me look good, and that was just before I departed. It was during the Reagan administration. Jim Fletcher was, I think, instrumental in causing that to happen. I mean, here he was, a Republican, and of course now he's got a Republican President in there, and he said, "You'd better do the right thing."

Those were the days, too, when I think NASA's general image was much better than it is today. I say that not because the Centers and the people in the Centers are less qualified; it's the perception. Was it Marshall McLuhan who said, "Perception is reality"? In your business, you know that to be true. It's what people perceive to be the case that generally turns out to be the case. Unfortunately, I think there's a perception that NASA is not what it used to be, which is a little sad, for me, anyway. I guess that will change. I hope it changes for the better. NASA has to worry that every institution ages, just like people age, and some of the symptoms of aging are they get hardening of the arteries, their communication is poor, they get more lethargic, and they aren't very light on their feet. It's very important to move forward and to change with the times.

Religions have this problem in spades, because some of them, like the Catholic religion, has been around for so long and so steeped in tradition, and yet even they have to work a little bit to change, to try to stay in tune with the popular beliefs that are reflected in their constituency. I think NASA has the same problem, and one hopes that that will happen again, but NASA's older now and so it's very important that NASA pay attention to that, and I guess [current NASA Administrator] Charlie [Charles F.] Bolden will hopefully do that.

JOHNSON: At the time when you were an Administrator or Deputy Administrator, they were choosing the new group of astronauts that were going to be Shuttle astronauts.

LOVELACE: Sure.

JOHNSON: It was the first time minorities and women were included in that.

LOVELACE: Yes.

JOHNSON: Do you remember any of the decision-making that led to that?

LOVELACE: Sure, sure. I remember Bob Frosch and I discussed what I felt the need to start including. Minorities were always a challenge, and it was a matter of you couldn't find enough minorities that had had the advantages of college educations. That's less true today than it was thirty years ago. But women was a purely prejudicial thing, and so we decided, "We're going to open up the astronaut corps. We're going to get women in."

We were out for a meeting in Los Angeles [California]. It doesn't matter what group it was, but Bob Frosch and I were out there, and we asked Chris Kraft to meet with us. Bob said, "You tell him. You tell him," because Chris, to be honest with you, he did not think that women had the capability to really execute the things that were needed in an astronaut, a good astronaut.

We had a big discussion. Our wives were out there, and I think they had their ear glued to the door in the other bedroom, listening. We discussed it, and I finally had to say to Chris,

“We’ve kicked this around and we’ve made a decision, and the decision is that we’ve got to start including females in the astronaut corps.”

Well, to Chris’ ever-loving benefit, he said, “Aye, aye.” I mean, that’s just the kind of guy he is. He fought his case, he knew the decision went against him, he didn’t quarrel with that. He went back and instituted what has now brought—I don’t know how many there are. I’ve lost track of how many astronauts there are, but there’s a whole banana bunch of them. He went back and executed the program. He earnestly believed that it was asking too much of a female to do some of the things that the male astronauts had to do, but when he knew the decision had been taken, he saluted and he went off and I think did a good job on it.

Unfortunately, things, after Jim Beggs took over, seemed to get more political. The decision process seemed to get less technical and more political, and I mean we were flying schoolteachers. God bless the one that got killed [Christa McAuliffe]. Senators. Bill Nelson from Florida flew. What’s-his-name from Utah.

JOHNSON: Jake Garn.

LOVELACE: Jake Garn. I think Bill Nelson, when he found out how dangerous it really was, was really, really upset that nobody had told him, and I somewhat agree with him, and I do with the schoolteacher. Everybody says, “Oh, well, NASA will take care of me. NASA can do anything.” That was the kind of ethos, and, of course, that isn’t true. You’ve got to stop believing and drinking your own bathwater, as the saying goes.

It turns out, I think that was not the high point of the Shuttle Program, frankly, certainly not when we killed that schoolteacher with all her pupils watching it on television [STS 51-L,

Challenger accident]. But what else? It's easy hindsight. Easy, easy hindsight. I know why they did it, but I tended to be more interested in the technical aspects of it than the political aspects of sell the program.

JOHNSON: In that first group of astronauts, and of course the women that were chosen, did you get a chance to meet some of them?

LOVELACE: I was never part of that process. I met some of them later on, but not in the selection process. I stayed out of that. I think JSC did a good job in the astronaut selection, and the only changes that were made were to try and include women in that and minorities. We weren't trying to exclude minorities; it was just harder to find them. There were more capable women available than there were capable minorities. But, no, I never dabbled in that process. If it worked, it ain't broke, don't fix it, and it didn't need fixing, except needed to consider the gender problem, and Chris Kraft fixed that.

JOHNSON: I was going to see if Rebecca had any questions.

WRIGHT: I have a couple, and one I'm just going to piggyback on that one. You're looking at women in the astronaut corps. Was that also down through the ranks of the agency, as far as promotion in some of the levels?

LOVELACE: I think it was, but as you probably know, and it's hard to reflect back on what things were really like thirty, forty years ago, but there were fewer women in engineering schools. It's

not true today. I know when I was going through school, I was always terrified if there was one woman in a physical science class because I knew we were in trouble. But they were really a minority, not gender minority, but a minority in terms of trained engineers or flight test pilots and this sort of thing, that so many of the astronauts had to their credit to get selected. But that has changed, I think, dramatically in the last ten, twenty years, and should have. Should have happened earlier but didn't. So there you go.

WRIGHT: I was going to ask you about your years, so many years in the Air Force before you came to NASA. Then right about the time you came over to NASA, we were closing out the Apollo Program, and we had the flight with the Apollo-Soyuz Test Project.

LOVELACE: Yes.

WRIGHT: I was thinking about all the training that you had during that time period in the Air Force, and what your thoughts were of the first mission that you were somewhat involved in had to do with the Russians.

LOVELACE: Well, it was the last Apollo mission, as you just observed, and it was the only Apollo mission that I was personally involved with, and I thought it had its unique challenges. Language. [Thomas P.] Stafford, he was a unique astronaut in the sense that he learned enough Russian that he could communicate with his cosmonaut colleagues, and I think that it was a success. Well, it was a success, I guess, on two levels. One, technically it was a success, obviously, but I think it was a success as it related to international cooperation and ability to

work together, something that we're going to have to learn to do even better for some time now because we'll be relying on the Russian capability to access the [International] Space Station.

WRIGHT: Speaking of Station, during those years that you were there and Shuttle took up so much of people's energy, were there a lot of discussions of Station and how Station was going to work into that project as well?

LOVELACE: There was some discussion. In fact, there was some discussion about our having our own Space Station. One of the things that has always intrigued people, they said, "You're taking that external tank up, right?"

"Right."

"Then what do you do with it?"

"We throw it away."

"Well, why don't we keep them and hook them all together? We'll have a space station."

Well, it says easy, does hard, as the saying goes. There was a lot of discussion, and I think the thing, of course, that gets in the way of international cooperation is nationalism and the feeling that, "Well, we can do it better than you can do it." But I think we've made a lot of progress in that, and I think even today with the fact that our astronauts ride the Russian vehicles up to and back from the Space Station, but we may have to learn how to do it even better because it is expensive business.

If there's anything to convince you that the world is small, and smaller today than it was then, just look at the economic conditions around the world and how they affect our local economics. We're already worrying about if Greece is going to go bankrupt, and the stock

market goes down or the stock market goes up. So it is a small world that we live in, and all that means to me is that we're going to have to learn to have more cooperation amongst countries that have the wherewithal technically and financially to do some of the things that need to or should be done. Certainly going to Mars, that says easy, but that's quite an undertaking.

WRIGHT: You had talked off and on about goals and attempting to achieve them. You were also a participant, or a victim, of having to be part of a number of presidential transitions. How does that impact the goals or hinder the goals of what the agency may or may not want to do when you have so many political or presidential administrations that have come through?

LOVELACE: It's always a challenge when you go through a change in administration, and I think they have gotten more challenging as time has gone on. I think, frankly, that the transitions that I went through, notwithstanding some of Jimmy Carter's remarks, were really a piece of cake. But [President] Barack Obama represents a challenge that I think we have not calibrated, or I haven't got it calibrated. You always worry a little bit about what this means for the programs, the ongoing programs, because there are no one-man, one-day jobs left worth doing. There aren't. The jobs that are left to be done require more people and a longer time period and financing than one administration, so the continuity is always of concern.

It ties back to my earlier comments about my anxiety about the perception of NASA today. Principally, I think the political perception, which seems to be getting a little more strident with—I read in the paper that Congress wanted Bolden to explain to them what they were going to do, and he said he can't do it right now and brushed it off. So I don't know. It's nervous-making.

WRIGHT: I think at some point you'd mentioned that sometimes we believe that NASA is not what it used to be. When you were so involved during those days, what did you believe NASA was and what NASA could be?

LOVELACE: I think NASA was one of the institutions in the United States, not the only one, but a major institution in promoting technology and technology growth. In fact, it's almost a little embarrassing, I think, sometimes, and I'm not quarreling with you folks who are in the P.R. [public relations] business, about these are all the spinoffs. In fact, we used to print a booklet—maybe they still do—spinoffs of the NASA technology. Most of it was true. Some of it was taking a little bit more credit for some things that were going on and went on before NASA was even around. But, that really was another way of promoting NASA and maintaining a positive image of NASA, which I always had.

I know, as I mentioned earlier, my wife felt that it was quite different to be in a position of responsibility with the Air Force than with NASA. In truth, it wasn't quite the difference that she thought, but back to what Marshall McLuhan said, the perception for her was the reality, and she was a lot happier if she could say I worked for NASA and not for the Air Force. But everybody has an opinion and is entitled to it, as a matter of fact.

WRIGHT: I have one other question, and hopefully you'll tell us some good stories. Would you give us some background of the Ham and Eggs Society? We've heard people talk about it, and the group of men that belong to that group are very closely bonded because you've got such a

long history together. So if you could give us some background, because it's such a brain trust when you start to see who all was involved.

LOVELACE: I'm not going to tell any stories out of school, but Tom [Thomas L.] Moser I give credit for setting up this last encounter here, and also I should say Charlie Bolden supported the Ham and Eggs Society group in terms of viewing the last launch. Many of them are not with us. Walt [Walter C.] Williams is gone. I can't recall the number of people who have passed on. Certainly, give it another ten years; they'll probably all be gone except for a few of the young bucks who will still be around. But, no, I don't have any stories. I'd better keep to myself about that.

WRIGHT: What's the common thread with all of you?

LOVELACE: I think we all set that date two years in advance and then set about to make it happen at the lowest risk we could, and it was a lot of work to be done at Marshall and at JSC and in the industry and down at KSC. The facilities weren't even complete down here to accommodate the launch. So I think it's almost unbelievable that viewing the workload that was in front of this team of people, that they could sit there two years in advance and set a date and then make it happen. We had an unforeseen software glitch, which if we had shut down and cranked up again would probably have gone away, but that's not the way NASA works. So we said, "We're going to find out why it shut down," and the Johnson team, simulator team out there did find out. I don't know that that answers your question.

WRIGHT: How important was it for this group to have someone in your position to be part of that decision? Because you had to support that date, Headquarters had to say, “Yes, we’ll support that date,” because as you mentioned, you had to go defend the program in front of Congress to answer those questions. You bought into it just as much. You had confidence in them.

LOVELACE: That’s right.

WRIGHT: And they must have had confidence in you that you would support them. So you put all those ham and eggs in one basket.

LOVELACE: Make an omelet pretty quick, huh?

I would have to say that the fact that I accepted, because I left the room and I said, “You guys hammer away on this thing, without my being present, and then I’ll come back and we’ll talk about the date.” I think the fact that I accepted that date without saying, “Oh, well, did you consider this?” was a display of confidence in this group, that there was no other better way to demonstrate than to say, “Okay, you believe it, I believe it.”

It certainly made congressional interface easier for me, but that wasn’t entirely what I had in mind. It was a massive research and development program that rolled on and on and on and on, and the Congress said, “That’s wonderful, but when are we going to launch?”

I think they had confidence in me, but they had confidence because I had confidence in them, and they were just a bright group of people who worked hard and came up with the right date, right answer.

WRIGHT: That was my last question. I just wanted to ask about your thoughts about that brain trust of men.

LOVELACE: Well, yes, and, you know, there wasn't a woman in there, and that's a tragedy. Here I used to go around the country and I'd say, "Look what we did. We put a man on the Moon and we brought him back safely. Isn't that wonderful?" Oh, everybody clapped, clap, clap, clap, clap. I said, "Do you realize we did that without 70 percent of the intellect of this country? We never even used it. We didn't use any females. Minorities weren't in the picture. So whatever you think that is, 70 percent or whatever, that's what we accomplished. Can you imagine what we could do if we could get it all together?" I still believe that today.

JOHNSON: I do too.

LOVELACE: Do you?

WRIGHT: I do.

JOHNSON: Yes, definitely.

LOVELACE: I would think you two would appreciate it. We made some progress, but it's miniscule compared to where we were. We've got a long way to go, and we're going to see a female President one of these days, maybe upcoming. I don't know. We'll see.

WRIGHT: We'll have to see.

LOVELACE: So it is a case that we don't use the whole intellectual capability of the United States. We say, "Well, that's a man's world." That's baloney. There's other words for that than baloney, but we'll be polite.

JOHNSON: Is there anything we haven't talked about that you wanted to mention?

LOVELACE: I think you've covered the ground pretty well. I probably have said more than I should about my anxieties about the current administration, but they're real.

JOHNSON: You were in charge of a lot of the commercial launch services for General Dynamics.

LOVELACE: Yes.

JOHNSON: With the idea of going into space and using commercial for the future, what do you think about that compared to what you were doing?

LOVELACE: Well, I spent a lot of General Dynamics' money, I guess, redoing the launch complexes down here and getting the production back up for the Atlas, and it got to the point where they developed a new financial unit. It's called the Lovelace Unit. It was 100 million dollars. Well, we did put a lot of money into it, and but we couldn't convince NASA that they

needed to have commercial launch services. “No, we don’t need that. Air Force doesn’t need it. We don’t need that.”

Our first launch was for the Italians. We got some overseas launches, Japanese and Italian. Then we got some U.S. launches, a few U.S. launches into it. It’s ironic to hear the Obama administration saying, “We want a commercial launch service, and we’re going to turn a lot of this over to the industry and they can make the investment.” Where were they when I needed them?

WRIGHT: It’s all about timing, isn’t it?

LOVELACE: It’s timing. That’s exactly right. Born thirty years too soon. But having been in that business and knowing the costs associated with doing it, I’m a little bit skeptical about how successful they’ll be in convincing private-sector people to invest the kinds of money that are going to have to be invested to do that. I can’t ever think of his name now, but there’s a couple of these digital millionaires around that are putting money in, but even by their standards, this is going to be a long haul. I’m not, by saying that, unhappy to see them attempt this. That’s not the issue. It’s that I would be much happier if we had a good marriage of a government-sponsored and industry-executed program. I think that was the success of Apollo and was the success of the Shuttle Program, and it’s really unreasonable to expect industry to step up and shoulder that financial burden. We’ll see. I think we’re making some progress, but as I say, they weren’t around when I needed them.

JOHNSON: If there's nothing else that you wanted to talk about, I want to thank you for doing this today and talking to us.

LOVELACE: I don't think it's of great value to you.

WRIGHT: Well, we do.

JOHNSON: We do. Definitely.

LOVELACE: Don't break your pick writing it all down. Okay?

JOHNSON: All right. Thank you.

[End of interview]

[Attachment: The Story of the Ham and Eggs Society, by LeRoy Day](#)