RONALD M. SEGA (Session 2)

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Interviewer: Carol Butler

Butler: Today is September 9, 1998. This is an interview with Dr. Ron Sega at the University of Colorado, Colorado Springs. The interview is being conducted by Carol Butler for the Shuttle-Mir Oral History Project.

Thank you again for taking time to have this second interview to talk about some of your involvement with the program.

Sega: My pleasure.

Butler: To start with, we can start back with your STS-60 flight and when you first joined the program in 1990 as an astronaut. When did you hear about the Shuttle-Mir Program or the agreements to actually fly a cosmonaut on the Shuttle? Was that before you began training for the STS-60?

Sega: I believe that we had heard about a Shuttle-Mir Program around the time of our assignment to STS-60, but we didn't hear that the assignment to a cosmonaut on STS-60 would happen until after the first five members of the crew were on board. So the announcement that there would be a Shuttle-Mir Program, I think, preceded the assignment of STS-60, but the actual inclusion of a cosmonaut, I believe, followed the announcement of the crew, the initial announcement.

Butler: Was it much long after that announcement?

Sega: I don't believe so, but I would have to go back and see if that was the case.

Butler: When you were training for that flight then, after the cosmonaut was announced and you began training with them, was there any specialized training for this flight that would have been different than a mission without a cosmonaut?

Sega: In two ways, there was a--well, probably more than that. There was a difference. One is getting to know the cosmonauts and their families, so we not only integrated the cosmonauts into the training, but also their families in a social context. Our crew took some Russian classes as part of our training. We worked with investigation teams that were joint, U.S. and Russian researchers, investigators, scientists, for the payloads that were on board STS-60. Again, a subset of experiments were joint U.S. and Russian experiments.

Butler: Do you remember what some of those experiments were, offhand?

Sega: The medical experiments were at least done jointly. Sergei [Krikalev] and I were assigned to a posture stability stand test protocol that involved baseline data collection before and after the flight. We were involved in a neurovestibular battery of tests that proceeded before the flight, during the flight, and post-flight. It involved Sergei, Jim [Wetherbee], Ken [Cameron], and myself. I was our crew lead on that one, and the metabolic series that involved Franklin and Charlie. So the medical experiments were done in a joint fashion.

Earth observations were done in a joint fashion, where there were ground truth teams. Those that were doing work on the surface were gathering data. At the same time we were taking pictures in the visible and the infrared. The infrared film that the Russians supplied was in reasonably wide rolls that needed to be cut and perforated to fit in a Hassleblad camera. So we would take pictures simultaneously on a single bracket with Russian and U.S. infrared film at a particular site that was identified by this joint team of U.S. and Russian investigators. Then we had some dosimeters, as well, that were joint U.S. and Russian. I'd have to go back to my notes to remember any further joint efforts.

Butler: After this flight, did you realize how much involvement you would have further with the joint missions and with the Russians?

Sega: My expectation after landing on STS-60, that my involvement with the joint program, the U.S.-Russian program would probably be over and a follow-on flight or assignment probably would not involve work with the Russian cosmonauts or the Russian space program. I was wrong.

Butler: When did you find out about the future opportunities then for you to become, I guess, next in the DOR [Director of Operations – Russia]?

Sega: Let's see. It was certainly after landing on STS-60. It would have been in late spring or early summer of the year. Well, let's see here. In fact, the request to take that assignment was made when I was supporting Dick Richards' flight that year as one of the family escorts down at the Cape. So that's actually the time, so we could go back and see when that flight was. But it was, I think, launch day of Dick Richards' flight at the Cape when I talked to, I believe, Dave Leestma or Bob Cabana, or both, about this request to take an assignment over in Russia as the DOR.

Butler: What did you think when you were first offered that opportunity?

Sega: Well, it was a surprise, and that I was not as prepared as I would have wanted to be in the Russian language, in particular, for taking that flight. So I accepted the assignment and took the Russian classes at

JSC [Johnson Space Center] and then over to the Defense Language Institute for roughly six weeks, September and part of October, I believe. Then off to Russia in early November.

Butler: A crash-course.

Sega: Sure was. For me, learning the Russian language was quite difficult. By the time of the second space flight, the technical Russian was coming along, but the general conversational and social Russian was very difficult.

Butler: It is a challenging language, certainly.

Sega: Especially if the conversation is not done in context. You'd see a discussion in a particular environment of the Mir station or the simulator about some components or some activities, and that would be easier for me to understand and put it in context. Many of the words are quite similar to English. But without context, in a more general conversation with colloquial expressions, it was more difficult.

Butler: Obviously, you've picked up enough of it to do a pretty good job while you were over there and on the flights.

Sega: Fortunately, we had a lot of help. The Russians that were in our office were a great deal of help.

Butler: Can you go over the different individuals that you did have in your office and what some of their roles were?

Sega: The number of Americans in Star City varied from probably six, at the lowest number, to thirty-five or so at the highest number, when science teams and medical teams would come in. So during the preparation for the flight, we would have periods when hardware would arrive, technicians would arrive, medical personnel and research physicians, research scientists would all converge on Star City. Typically, during an event where there's a lot of activity, we would have visitors. So the numbers would rise and fall throughout that five-month period. But it was a fairly intense period of time as we were engaged in activities that were new for us, and for the Russians, preparing a crew to fly out of Baikonur.

Butler: That must have been quite different from any kind of preparations that were done for a Shuttle flight.

Sega: In many ways there are similarities of crew training, but in many ways that's different. The Russian

training system certainly has differences from ours, and the equipment and other support structure for our side of the activity was also more difficult to put all of the parts in place because of the distance involved in obtaining spare parts and those types of things.

Butler: Looking at the mission and preparing for that, what were some of your other duties as DOR, besides helping the astronauts train for their mission?

Sega: With a relatively small number of people from NASA assigned to Star City, everyone needed to do the odds and ends types of activities, as well as their main jobs, so the unpacking of equipment and setting up our office space and doing those day-to-day activities was all part of everyone's job. We moved our office during that period of time to, I think, its permanent location, at the end of one hallway in the Prophectory Complex, and learned how to do our business with the power supply and equipment that we had. So, computers were all attached into uninterruptable power supplies, antennas were pointed to the correct satellites, MRSAT. Antennas we would coordinate with the Russian communications experts as to where we could mount the antenna, in this case on the roof. Stringing wires for our communications system and installing those kinds of hardware and software parts that the operation required.

I also had the opportunity of training, as had two predecessors. But in my case, I was the first mission specialist, so I had the opportunity of training in the Orlon suit and doing a run in their equivalent of the [unclear] at the hydro lab in Star City. I had to bring back the certifications of scuba diving and the runs that I had done in our equipment at Johnson Space Center. I converted some of the training hours that they had scheduled for me into this training exercise. It was fascinating.

[Dr. Michael] Mike Barratt also got checked out in scuba gear, and so he also was in the water during at least most of that three-hour training exercise, in which the flow included egress from one of the modules, translation along the handrails, working on their boom, their equivalent of an arm, and a manual type of apparatus, working with the tools, the Russian tools and some U.S. tools that I had brought from Houston to do a comparison between the U.S. suit, the Russian suit, U.S. tools, Russian tools, using each suit. So within eight days, I believe, of a dive in the U.S. I repeated that similar activity in the Orlon suit in Star City, Russia. So it was, for me, a real opportunity, I guess the first American to have that chance of training in their suit and in their facility. On a subsequent trip to JSC, I did a short presentation to the astronaut office on that experience, with some slides and some video.

Butler: What were some of the differences, when you compared the suits and the tools?

Sega: The U.S. suit is more complicated. It has more joints, is more difficult to enter and exit from than

the Russian suit. The gloves were less flexible in the Russian suit and the visibility a little less flexible in the Russian suit. When you didn't have some the joints from the U.S. suit, again it would be a little conscious of what your body position was to do a given task. But both suits worked very well for the task that they designed to do, so I was impressed with both.

Butler: Was there a difference in training to use both the suit and the [unclear]-type facility?

Sega: Again, there were differences, but more similarities between the underwater training that goes into preparation for a spacewalk. The divers performed the similar function in Russia and in the U.S. The weighing out of the suits is necessary and done in a similar manner to make sure that you are neutrally buoyant in all attitudes and positions prior to the beginning of the exercise. The level of safety, I thought, was quite high in both facilities.

The training team was very professional. We went through the tools in a classroom environment and a schedule of activities and tasks that we planned on performing in a similar way that you would at the Johnson Space Center. In the case, Carl Walts [phonetic] did the dive at the Johnson Space Center as we worked through some of the tools that a joint committee between U.S. and Russian EVA team members were considering, common tools. My opportunity to do a run in Star City allowed us to get at least some initial data points on common tools and the use of those tools in the two suits.

Butler: Do you know if any of this work that you did particularly on the suits and tools will be used for future developments for ISS [International Space Station], coming up with different suits?

Sega: It was the first run in Star City, and after that many more runs were done with U.S. astronauts, as they not only did it as part of their time in Star City, but also in preparation for doing EVA on long-duration flights aboard Mir. So it was just one initial step in the process of working with the Russian equipment and facilities and trainers en route to the Phase One Program and then on to ISS.

Butler: Looking back on your opportunity to be a DOR, was there an average day in the life of a DOR?

Sega: It started early and ended late. That was the common characteristic of a day during that period of time. The number of hours that many people there at Star City spent was needed, but it also made for very long weeks. I think that I was in the area of eighty- to a hundred-hour work weeks during that time. On some days one would work eight hours of a Russian day, followed by eight hours of the U.S. day. So it was in the range of sixteen hours and sometimes a little bit more in a work day.

Butler: Long days. When you first arrived over there, as compared to when you left, what were some of the changes that you were able to help bring about? I guess the whole program was pretty new still at the time. What were some of the steps that you had to clarify?

Sega: Well, in terms of infrastructure and support, we negotiated additional rooms in the Prophectory for longer-term NASA personnel to stay. We moved the office into a more permanent facility and ordered the furniture, as well as the additional equipment for that office space. We brought over vans and hired drivers that helped with the transportation of our NASA personnel in and out of Moscow and Kaleningrad [phonetic] and Star City.

So we added to staff, added any office staff, added to staff drivers. We'd see more people in the medical areas and especially in doing the scientific studies, in life science, as well as material sciences, arriving in Russia. We set up the initial agreements with the Russians for bringing on a communications system that would be integrated with other parts of a U.S.-designed communication system in the Moscow area.

Ours was the tallest building, which was an apartment building, if you will, in Star City, the [unclear] in Moscow. From that central point would allow communication to different sites in and around the Moscow area, as well as back in the U.S. through a node at the Marshall Space Flight Center.

The housing situation was worked. The initial breaking of ground occurred for the buildings that the Russians would later put up for U.S. crews, principally, maybe some European crews as well. Provided for the infrastructure that Shannon Lucid and John Blaha would need when they arrived, so made sure that transition occurred smoothly.

I also saw the changes in getting routine activities to work, phones that would be more reliable for the apartments. We were using principally the Russian phone system and that improved to a phone that would more regularly be able to connect to the United States before we left. Food was becoming more available from more Western-type stores in Moscow. Also the stores in Star City would tend to have a bit more of a supply near the end of our tour. So the amenities that one would see in Star City from the beginning of the tour to the end of the tour, improved.

Butler: I guess that was an appreciated thing.

Sega: Well, by those that had seen the transition, it certainly was. Those that had arrived for their tour probably would not have recognized the situation that was present just five months prior.

Butler: Talking about changes, even in the five months, I think you mentioned in the first interview that

you also saw changes in Moscow itself. Can you talk a little bit about that?

Sega: The changes were occurring at a rapid rate during that period of time, from storefronts improving in appearance, from more goods appearing in stores, even more cars appearing on the highway system. There was an influx of Western business in Moscow, and an improvement in the overall infrastructure of the city was occurring during the time that we were in Star City. Now, the changes in Moscow were more evident than those in Star City. It was on the outside of the outer loop so that you didn't see a great deal of change in that part of the country, as one would see in Moscow.

Butler: Taking a little bit about some or both of these changes, you mentioned how one of the things that you were involved with was getting transportation and vans for the NASA personnel. How did you first get around before you did have those arranged?

Sega: There was an agreement to have Russian drivers in there, [unclear] primarily, that were part of the motor pool in Star City that would provide the transportation to and from Moscow. That was part of the original agreements for Phase One, but that arrangement was negotiated up to Norm's flight. So there needed to be some transition after that part of our program was completed, as well as accommodating the additional people that would be involved in the investigations on the life sciences material sciences side.

Butler: Looking some more at the transportation, we've heard a little bit that driving in Moscow could be an entertaining prospect. Do you have incidents that you can recall that were? Or just a general feeling of the driving situation?

Sega: The drive to and from Moscow was generally an experience. The drivers were, by and large, quite good and would drive like many of the others on the road. So it was just a normal way of driving and still the best way of getting from one point to another for us.

Butler: Was there ever any discussion about getting driver's licenses for the American individuals?

Sega: There was some discussion about the driver's licenses for the U.S. folks, but the issue of storing the vehicle and parking it in different parts of Moscow, outside of the embassy compound, for example, was always a question whether that was a good idea. And how difficult that would be to find a place, a simple place to park, whereas the driver situation, and hiring what turned out to be a very good addition to our team, I think, was a good solution. They knew how to get around Moscow when [unclear], which occasionally happened by the [unclear] kind of folks there, or the guard would be more adept at getting us

to the next point, getting through that situation. We didn't have to worry about where the vehicles were going to be when we got done.

Butler: It would be kind of like trying to park a car in New York City.

Sega: Something like that, yes. There's also an issue of some cases of European vehicles being stolen in that time.

Butler: That would be quite inconvenient. [Laughter] Come out and don't have a car anymore. That sounds like it worked out pretty well in the long run.

Sega: Yes, I think so. The drivers, when they weren't actually engaged in driving, would come up to the office and try to help out, as well. It was a good rapport with everybody in the office.

Butler: Always helps to have that. Talking a little bit about rapport, can you go into some of the relationships between the American side and the Russian side, some of the cultural differences? Were there any holdover emotions from the Cold War, anything like that?

Sega: I think you could find the entire spectrum among fairly significant numbers of people there in Star City, from those that very enthusiastically embraced the new program between the two countries, to those that were quite reluctant to embrace this new program. Most fell somewhere in between. As each side started to understand the other more, the situation continued to improve. I think we ended up sharing a lot of common interests and experiences. Some things in space point to a way of doing things that both countries kind of evolve to separately. You would find it quite normal, natural, how to take care of a certain technical situation when it concerned space flight. The cultural differences in the more social environment probably were a little broader than they were in the technical aspects of space flight.

Butler: Some of those cultural differences, as you did get to know each other better and as everyone was working together, were there opportunities for social events that would kind of help smooth those?

Sega: There sure were. We participated in some of the Russian activities, whether it be a dinner at some of the families' apartments or out at--I forget whose *dacha* we had one dinner, went out to apartments where the engineers lived. That was connected to Energia. They would live there and commute into Star City until they got to a certain time prior to flight, in which case they would move into space in Star City. So we would have a dinner or two out in that area. That's where Sergei Krikalev, for example, lived.

We also decided to throw a Christmas party, the first one ever. I have the invitation around somewhere for the Christmas party that we held in the large room with a fireplace in Star City. So we would burn the fireplace and we had some stockings hung. as best we could, American decorations. Some of the engineers and scientists were cutting out snowflakes and those sort of things, out of white paper, for decorations, because we didn't have much. But we threw a somewhat American version of a Christmas party for the Russians. I have photos of those, as well, with General Klevuk [phonetic] and the whole Russian contingent were invited. Many came to this Christmas party. This was primarily a cosmonaut/astronaut event for the New Year's Eve party. So there were a few of those that we worked at. The Christmas party was a notable first, though, for Star City.

Butler: Have there been others since then? Have they continued the tradition?

Sega: I'm not sure. I would suspect the answer would be yes, but I'm not sure. We thought it was a good idea. We even had pictures of the prime and back-up crew members for the Soyuz launch and they were symbolically put on the Mir station and the Shuttle. It was kind of a cartoon. I think it was a chimney actually installed on the Mir station and the Shuttle was sort of the sleigh, being pulled by reindeer en route to the Mir station with just the pictures of a head view of the three for the back-up on the Shuttle coming up toward the Mir station, the other three then on board the Mir station as it would be for STS-71.

Butler: That's great. I'm sure that was well appreciated. Talking a little bit about the cultural and the relationships and such, I've noticed in the Star City updates that you passed on to us that some cross-cultural training was begun while you were over there. What did that entail and how different was that from what had been done before?

Sega: The cross-cultural training, as I recall, was not very extensive, first of all, led by a U.S. group. A contact point, I believe, would be Al Holland.

Butler: Sure, we can talk to him.

Sega: On the reasonably structured syllabus of what they wanted to cover and some discussion on cultural differences. For us it was relatively late in our stay and it probably reflected more of a confirmation of many of the items that they presented. There were some new issues as well, but probably a good course for people that were newly arriving, but in our case, a little downstream from our perspective.

Butler: You'd learned it all on the job.

Sega: Quite a bit of it, yes.

Butler: There was a section in that mentioned that was about women in the workplace. A little bit from what we've heard from some of the others that we've talked with, the Russians were a little bit surprised about the American women. Do you have any perspective on that?

Sega: In general, the American women were assuming more roles and responsibility, on average, than on the Russian side, so it was a difference that we understood, that the Russian society and culture was simply behind where we were. I think it was important for both sides to recognize that. It was part of the cultural and administrative differences. Some would have some origin in a gender base, but others were in a structural sense.

We would have a meeting in Star City where I was the NASA chief, if you will, [unclear]. The Russian was Major General Klevuk. So in the meeting we'd have the different people on the staffs, if you will, there. It was the expectation that the at least initial presentation would be done by the respective chief, which is not the situation that one would find in the U.S. The organizational lead would defer to the expert in the area to give that portion of the presentation. If it was in a payloads-related area, you would have somebody that was working the payloads. If it was baseline data collection or communications, you would naturally defer to the people that were the experts, the flight surgeons in the medical area or whatever.

In this case, many of those issues would need to rise to the top, some decision would be made, and then it would go down into the working level. I think it's fair to say that's an inefficient system where many issues could be worked at the operational level between the two organizations. You saw some of it evolving to that, but there was still a very strong hierarchial structure in place.

Butler: Probably they've been used to it for a long period of time. I guess as we work together a little more, both sides will change their methods of doing things. Have to see what progress is made.

Going on, talking a little bit about the communication system, I know eventually then that it was a pretty good system like you were talking about, but before it was pretty erratic at times. Can you talk a little bit about that and what problems you did have?

Sega: The two principal systems were through the Russian phone system that allowed you to connect to an AT&T operator, sometimes by way of the Russian system into, say, the U.S. Embassy. Another means of communication was through the NMARSAT [phonetic] system via two portable systems that we had. One was in the office area and one was in an apartment area. So we became reasonably good at understanding

the signal strength problems of the system and ways that we would try to restore the communication signals and the channel. One would point to a satellite over the Indian Ocean, the other one over the Atlantic. So we had some idea what the look angles were for those two ways of reaching a satellite and eventually sending either voice and/or data back to the U.S.

Butler: I'm sure that probably contributed to some of those long days, occasionally.

Sega: It sure did. Some E-mails would take hours to get through.

Butler: Wow. Technology, I guess, eventually prevailed.

Sega: Yes, it had more stability in the communications link and so a more normal E-mail traffic would allow that means to go back and forth. We would participate in the conference calls in Houston. Some were at the very beginning of the Houston day, which accommodated our schedule better than one that would be in the latter part of the Houston day, which would be midnight or so in Moscow.

Butler: This is moving on to a slightly different tack. I noticed, again while reading the Star City updates, that you mentioned occasionally the Chetznya [phonetic] situation that was while you were over there. How much did that impact what you all were doing over in Star City? How much of a concern was it?

Sega: It was clear that the country was at war when we were there. The nearby fields at Chetzcolski [phonetic] would be sending transports toward Chetznya, and when they were loaded with cargo, they would occasionally fly relatively low over Star City before they could gain the altitude and continue towards Chetznya.

The Russians had moved some of their security people onto the trains in other areas in and around Moscow to help with the security there. That would result in fewer people, actually, in Star City and some gates being closed, in which case, you'd have to work yourself around the normal way of going in and out of the training area.

We would try to get a group meeting together when new people would come onto Star City and lay out the situation as we knew it and what precautions to take regarding either taking photographs of different parts of the facility, or travel in and around Moscow, not to be involved or near demonstrations, and those types of activities. So it was an atmosphere that was clear that the war was going on. You would see fairly graphic reporting from the warfront on TV. At that time we only had Russian TV. That was another evolving benefit of the communications system. You had some other choices later on, after we were gone. It was clear that this conflict was ongoing. Now, in terms of the actual training on Star City,

except for working your way around the gates, that was relatively unaffected by the war in Chetznya.

Butler: You mention some demonstrations in Moscow. Were there many of those that went on that you were aware of?

Sega: I think there were a number of demonstrations, but we avoided those areas that we had information that there would be demonstrations. Many times our drivers knew this information, whether it be on Red Square or somewhere else. There would be some. It would be primarily on the weekends, but that would be primarily when we would go into Moscow.

For me, I would try on Fridays to go into the embassy before the NASA liaison office would close, pick up mail and generally have a meeting, because they would try to support our activities at Star City, as well as activities out at Kaleningrad and Krunichev Energia.

It was not a frequent visit by people from Moscow, as they viewed it as quite a trek to come out to Star City. We needed to come into Moscow on a relatively regular basis to carry on some of that business from a DOR perspective, as well as just picking up needed supplies and food and so forth.

Butler: I'm sure getting the mail was always a welcome occurrence.

Sega: Yes, sure.

Butler: Looking back, comparing your mission, first flying with the cosmonaut, then going to DOR and then you went on to STS-76, of course, those earlier being STS-60 and DOR helped prepare you, I'm sure, quite a bit for STS-76. What was the training like for that mission then? How was it different?

Sega: STS-76, the training involved a flow that was Shuttle-based primarily. With one trip I had, as the payload commander on STS-76, worked toward one visit for the crew to Russia, rather than two, but to extend it to a week and a half, so that some of the jet-lag time would be spent in getting some of these tours and the lay of the land in and around Moscow, and moving the really critical training with the cosmonauts that we would be interacting with, the facilities that we would be seeing the real hardware, and visiting the engineers that were involved with the docking mechanisms, going through the procedures that we were to perform in the transfer and on board the Mir station, to the end of that week-and-a-half period. We felt that that was a good decision and recommended that subsequent crews follow the one-visit plan.

Also, as we went through the training syllabus, worked with the team to change some of the activities, eliminating or shrinking some of the transfer training sessions and expanding one or two integrated sessions, because I thought that was more important for us to do in an integrated way with other

activities that were to go on, whether it be on our biology experiment called Bio Rack [phonetic], or in maintenance of the Shuttle, or other activities that needed to be done in addition to transferring of equipment logistics for Shannon. I believe that was also a good decision in retrospect, and that subsequent crews, I believe, followed a similar training flow. The approach and docking-- [Interruption]

Butler: You were saying that docking was, of course, practiced many, many times.

Sega: Sure, the approach and docking. I would continue to practice my Russian, as the speaker for making the rendezvous approach and docking calls in [unclear], the pressure checks and the hatch opening and those types of things.

Butler: When you finally got up there to Mir, was it what you had expected from all this training and from all your time spent with working with the Russians?

Sega: After hearing of the experiences of the two previous crews that had been on Mir and looking at the photographs of the Mir station, we had a pretty good idea of what the Mir would be like. Some of the tools were placed in more tenuous situations along the sides of the passageways, so you were cautioned, correctly, by the cosmonauts to be careful as we brought equipment through these passageways, not to dislodge pliers and screwdrivers and those kinds of things that were tacked along the sides. We developed a pretty efficient system. We were well ahead of our time line in terms of transfers on our mission.

Butler: The docking went pretty smoothly, obviously. Then there was a little bit of ceremony with the handshakes and so forth.

Sega: Sure.

Butler: Can you talk a little bit about that, how it was? Had you trained with the cosmonauts on the ground before or met them while you were DOR? Was this the first time for you?

Sega: I had met them when I was there as the director of operations, as well as the training trip that we had in Russia. They had made, I believe, two or three trips to the U.S. during the course of their training flow to work out some of the science that would be transported into the Mir station. Maybe just twice. I'm not sure of that. So we'd make a special effort to get together when they were in the U.S., as well. So we were comfortable working with Yuri Frinkel [phonetic] and Yuri Yusochev [phonetic] during the five days that we were docked. A kind of mutual excitement about getting together was clear.

Butler: Of course, I'm sure, it was exciting for Shannon.

Sega: Absolutely. And she was ready to get on with the work that she had trained to do.

Butler: Looking back on the flights and your time as a DOR, what would you say were the biggest challenges for each one along the way?

Sega: For the flights and DOR?

Butler: Yes.

Sega: Well, one's first flight in space has its own set of challenges in trying to prepare for a flight and an environment you've never been in. So I think I was working hard to anticipate anything that could go wrong, and worked hard in that training, and, by the second flight, knew those parts of the training flow that were different from the first flight, to concentrate on those and knew what to expect in many of the others that I had seen before on the first flight.

So the challenge on the first flight was the new environment, serving as MS-2 kind of flight engineer on ascent and entry as an arm operator, also as the lead on the wake shield facility, which I had worked on prior to joining NASA as a principal investigator and as the program manager prior to joining NASA. Then it was ready about the same time I was in line for a flight. I was assigned to STS-60, and therefore continued on that interaction with wake shield as the crew lead. So I was involved with that experiment in probably a little greater level than I would have had I not had that background in that primary experiment. Being involved with the primary experiment as one of the principal investigators was also, I think, a welcome challenge, but somewhat unusual for the space program. Then having a Russian cosmonaut on board and the medical experiments that were done made for a very busy flight. So the challenge was to accomplish this relatively large menu of tasks during that course of the flight.

In the phase of director of operations, it was once again a new environment, in this case, preparing for our first flight out of Baikonur and the first time that much joint activity had occurred since Apollo-Soyuz. So it was a series of challenges of overcoming many obstacles that appeared throughout the course of the five months, whether it be from Customs, which eventually was part of the agenda for Vice President [Albert] Gore [Jr.] and Prime Minister Viktor Chernomyrdin's summit in December of '94 to help unlock the Customs situation that involved delays when our items would arrive at Customs. Each activity tended to take more effort than you have anticipated prior to actually going into it, whether it be required passes for visitors at Star City, or for getting the equipment for baseline data collection to work in the environment

of the power supplies and the training facilities, to coordination for the trip out to Baikonur, or making sure the schedule was, in fact, accurate for our astronauts to train in facilities in different areas, Vezdaf [phonetic] or for doing suited runs with the custom suits to make they maintained pressure and those kinds of things, [unclear] suits and things.

The challenge, once again, was getting things done. There were many things to do and generally took a bit more energy to actually bring them to a successful conclusion in a program that simply had not had to do these before to prepare for launch out of a Russian launch site.

STS-76 challenge was similar to that of Cameron's docking flight, but added to it the transfer of the necessary equipment and coordination as to when Shannon would become part of the Mir crew and making sure that the seat kit in those things were transferred and in proper order, that we had a good plan for doing that mission. So it went pretty well, but I think we were also well prepared by the time we launched.

Butler: Had a little bit of experience to build on by then for everyone involved.

Sega: Sure. I think the challenge there was the proper preparation for STS-76. We, with our training team, did our homework.

Butler: Looking back on the Shuttle-Mir Program as Phase One for the International Space Station, of course, they're hopefully going to be applying many of the lessons learned from Shuttle-Mir to ISS, what do you think of the ISS Program? Do you think it is going to be able to build successfully on Shuttle-Mir successes and lessons? Do you think that marks a new future for the Space Program in international cooperation?

Sega: The perspective I have now, in September of 1998, is clearly two-years-plus old from being involved day to at the Johnson Space Center. I have participated on Space Station Utilization Advisory Subcommittees for NASA and also a Committee on Commercialization. So I've tried to keep in touch, but it's different than being involved day to day. So with that as a backdrop, I believe we have learned a great deal in Phase One for joint efforts in space with the Russians, as well as long-duration flight, the principal contributions to that learning probably in the operation side, whether it be doing rendezvous and dockings or communications with those on the ground and scheduling of experiments, to some of operations of the equipment on board.

I have not been as close to the scientific results, but I believe there were some particular successes and failures on the science side that would lead to a more successful program at International Space

Station. You do learn from your failures as well as your successes. So I think it was another good step towards the cooperative efforts necessary in the International Space Station.

Butler: You left the space program in 1996, and then came here as dean of engineering and applied sciences. How have your experiences in NASA and working with the Russians benefiting the program here, and how are you tying them together?

Sega: The College of Engineering and Applied Science is here in Colorado Springs as part of the University of Colorado, and it's in an environment that has a great deal of space activity going on. Colorado is number four in space revenue in the U.S., behind California, Texas, and Florida. So there is a great deal of activity going on here, stronger in the commercial and defense sectors than in civil, but there's still the civil space activities.

So the experiences from NASA have since infused some of the civil space activity into our program. About a year and half ago, over a year ago, we were invited by MOD and people at the NASA Johnson Space Center to present our program, our graduate program, a master's of engineering in space operations, to not only the JSC civil servant community, but also to the aerospace community, including Lockheed-Martin U.S.A., Hughes, now Raytheon, and some others in the Clear Lake area, to bring the education program that had been ongoing here for over ten years to the Houston/Clear Lake area, in particular to support space operations for NASA. So we have been engaged in doing that since January of this year. The one interruption we've had today actually concerned that program and making sure that we had proper books and information for that program down in the Houston area.

The Air Force Space Command is located and headquartered here in Colorado Springs and I have been a reserve officer in the Air Force. My position has been with the Air Force Space Command over the last two years. Commander General Estes, the Air Force, and NASA have embarked on increasing cooperation between the two agencies, and I have had a chance to play a small part in that, as well. So the NASA experience has, from a personal point of view, helped in integrating civil, commercial, and defense space sectors in our educational program here at the University of Colorado, supported some cooperative efforts between Air Force Space Command and NASA, and, I think, brought some additional interest on the part of students to the fields of engineering and, again, applied science, which is the college, and hopefully will lead to a number of engineers and scientists that will support our space program in the future.

Butler: Talking about the students a little bit, what advice do you give them when they come in saying they

want to be involved with the space program, just in general?

Sega: The space program needs are varied. In our college we span hardware and software kinds of disciplines. So I will talk to the students, encourage them to continue their studies and do as well as they possibly can, whatever they choose, but there are a variety roles that they can fill in being involved in the space program. There are some that involve flying in space. Many involve support of those operations in space. Many more involve the design, test, and building of equipment that will be involved in the program, as well as some of the scientific underpinnings, ground-based, as well as space-based work, for the program.

So I lay out a variety of options and listen to what they would like to do and try to assist them in choosing an educational background that would meet some of their goals, try to help a open a few more doors for them in the future, and not close many by narrowing in on something that's very specialized.

Butler: Have you seen a lot of potential in the upcoming students?

Sega: Absolutely. We have very good students, whether it be the undergraduate folks that are roughly half of those that are working in a community and half that are more traditional, coming from high school population, and our graduate student population, which at this campus is principally working professionals coming to the campus for evening courses, very bright students. I'm confident that we're going to do well in the future.

Butler: Is there anything that we haven't covered that you would like to talk about?

Sega: Not that I can think of today, however, more than open to either answering any questions that you may think of, or after reviewing what we have talked about, perhaps giving you a call.

Butler: Sure. Thank you so much. I think it's been quite interesting. I really appreciate it.

Sega: You're welcome.

[End of interview]