

**NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT
EDITED ORAL HISTORY TRANSCRIPT**

RONALD C. WOODS
INTERVIEWED BY REBECCA WRIGHT
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WRIGHT: Today is March 28, 2012. We're at the NASA Johnson Space Center [JSC] in Houston, Texas to talk with Ron Woods, who we consider a legendary space expert, who has spent the last 45 years in his field. I'm Rebecca Wright with the Johnson Space Center History Office. I thank you for being part of today's discussion. Most importantly, we thank Ron for giving up his time to share his knowledge and many of his experiences during this next hour, hour and a half. So thank you, Ron. We'd like for you to start by just briefly telling us something about your background.

WOODS: Well, I grew up around Houston here. My dad was an aircraft mechanic in Ellington [Air Force Base] in the early '50s. From that he went off to Japan, and then when he got back we moved around the United States quite a bit. I don't know who he upset, but we wound up moving from Homestead Air Force Base [Florida] to Minot [Air Force Base], North Dakota in the middle of the winter. So that tells you something there. After high school I came back to Houston, and didn't know what I wanted to do exactly. I wasn't ready to go to college, so I decided to go in the Army.

In the Army I had volunteered to go in in the engineering field. When I found out, really what I was doing in there was combat engineering. The guy says, "Well, you actually go in before the infantry and make bridges and put landmines and stuff in." It wasn't the engineering I

wanted to do. So they said, “Well, if you want to change direction you can go to jump school, be in the airborne.” So I did that. Then they said, “Well, how about being a parachute rigger?”

I said, “Well, that sounds kind of cool.” My mom early on had taught me to use a sewing machine if you needed your clothes darned or something, you do them yourself. So it was a real education there. I went to parachute rigger school, and we learned to use all kinds of machines. Our quality control at the end of jump school was you jumped the parachute that you packed, the last one that you did. That gave you a little upgrade there, your thinking about, “Yeah I got to make this thing right.” I spent from ’64 to July ’67 in the Army, and we worked on parachutes, we did jumps there at Fort Campbell [Kentucky] and also packed for the Air Force out in California for a while.

I only had two months left in the service, and my mother called and left word at the company office. We didn’t have any of the technologies that we have today for communicating, so she left word, and I got in line to call her from the outside pay phone, and lots of quarters in my pocket. I made the call. She said, “Well, you need to check on this job at JSC. It’s for survival tech [technician]. You have to use sewing machines.”

I called the next day and got an interview. I flew home. I went into CSD [Crew Systems Division] at the time in Building 7. I didn’t know anything about the space program, other than what I read or saw in the news; [Alan B.] Shepard takes his flight, that sort of thing. So the guy says, “Well, here’s the material. Sit down and sew me a box with a lid.” So I did that and gave it back to him. He goes, “That’s pretty good, come see me when you get out.”

I got out on the morning of the 27th, came here, had another interview, and he hired me on. I went to work on that Friday, and we were working, with all the new materials, pretty much

seven days a week except for the holidays at Christmas. But that's what got me into that. But it was thanks to my mom for recognizing that ad in the paper. That's what got me my job.

WRIGHT: It's always good to do what your mother says.

WOODS: That's what you said the other day. Do what your mother says. That's correct.

WRIGHT: When you arrived here and reported to Building 7, it was not too long after the Apollo 1 fire. So you were dealing with new materials. Can you talk to us about what you walked into, and how materials and the equipment were starting to be ready for the next crews?

WOODS: Well, two things happened. First of all, working in that survival lab, we did have a lot of new materials. I think where I had a good advantage was the guy says, "Well, why don't you go back to this bond room area and organize it?" In that bond room was a lot of Mercury and Gemini type hardware. I would get a chance to go down and talk to Joe [Joseph J.] Kosmo, or I think that's where I first met Joe, and Jim [James H.] Barnett, and even Ralph [J.] Marak—he still works in Crew Systems Division there—and talked to them about what is this, what material is it made from, and make out 911 tags for it and bag it and put it away.

Plus we were also receiving I think the first of the beta cloth. I remember going down and talking to Dr. Fred [Frederick S.] Dawn, who was the material expert at the time in CSD, and he would come up to the lab and say, "Okay, this is what this material is, here's the work order for it, how we purchased it." Plus we got to do the sewing for the designs that the engineers

came up with using all the fire retardant material. It was really interesting because it was a challenge for the engineers as well as technicians to try to make the materials work.

I can also remember at some point in time we had Red Adair, one of his guys. The famous firefighting company [Red Adair Company]. I think it was Boots [Asger Hansen] or Coots [Edward Owen], one of the guys that worked for him actually came out. We were building layups of asbestos into things for fire suits. So we had every kind of material you could think of there. Raw beta, one pass beta, everything you could think of that they were using to get the spacecraft safe. Even Astro-Velcro I believe at the time was being developed. It was a real interesting place to work. You gained a history and worked with those guys in the Mercury and Gemini program as well as making your skills a lot better at doing fabrication work.

WRIGHT: You mentioned that these folks from Boots and Coots came when it was tested. But also part of what you did was you were a suit subject. Could you share with us what that meant and what your role was in being a suit subject?

WOODS: Brown and Root-Northrop had the contract at the time to support suit subject events. So we went over and got the physical so we could get in the suits. It wasn't a major part of the job, but we would get in the suit and cycle test bearings or get in the spacecraft, and they could try different configurations of hardware. You might be just a volume in there, suited. There's things like that that we did. We didn't fly zero-G at that time, but we had an interesting time. I always said once you got into a spacesuit, you were just like hooked. What better job could anybody at my age have? I was just I think 21 at the time and had been out of the military, and

then walk into a job like that. You're looking at all this hardware and meeting all these engineers. The pioneers of Mercury, Gemini, and then start of Apollo.

WRIGHT: Part of your duties at that time, you were performing maintenance on different classifications of training suits. Can you share with us what those roles and those duties were? As well the different types of suits, and then how that evolved.

WOODS: When we were doing the suit subject work, you got to meet all the interesting people that worked for ILC [International Latex Corporation, Government and Industrial Division] across the bay there. That's where their office was on site. They had said, "Well, you know how to use a sewing machine. We need people over here to do that work." So I quit my job at Brown and Root-Northrop and went over to ILC to be a certified trained technician. They put us on second shift, and once again you're working seven days a week. We were on second shift breaking suits down that they had used during the day, of course with supervision. Everything we did, they would have to quality check it. We were working on mainly Class III suits that were used for training and also in the water tank. So we got our skills based on that, and we finally got a certification for it. Anyway, that's how you got to be a certified suit technician.

WRIGHT: These pioneers that had been the first space suit technicians certainly were very instrumental in your life. Can you share some of the lessons that they taught you early in that time period that you carry through the years that you've been here?

WOODS: Do it right the first time. That was the key to it, since you're working on a life support system. Just like going back into the military and doing the quality work that we did on personnel parachutes. We worked on 100-foot diameter cargo chutes, everything. But to work in that environment so that you made sure everything was right, even though you had inspectors come through from time to time, check the records. We had three guys working on layout tables packing chutes, so it was very important that you maintained that level of quality. That's the way we did it with the suits as well. We had ILC quality and NASA quality, which I always thought was a great thing to have. They stressed that to us, to do it right the first time.

WRIGHT: Was there a lot of differences between the quality assurance between ILC and from NASA?

WOODS: No, you did your work and your initial inspection was done by the ILC quality. Then you had these veterans that worked in NASA quality that came in and looked at that work, and pointed out things even in documents or the workmanship that you could do better. You always tried to do your best, but they would point out things to us. It was a good quality inspection way to go for the suits, the life support system. It was a must.

WRIGHT: Your first crew assignment was Apollo 8.

WOODS: I was fortunate enough—I think it was stated by Buzz Aldrin one time. He said, "I had the great good fortune to walk to the Moon." I had the great good fortune to get introduced to guys like Joe [Joseph W.] Schmitt, Al [Alan M.] Rochford, the first NASA suit techs. From that,

working on the suits at night and then we got on day shift, we actually went out and supported some of the testing. You always had somebody there with you that had been doing the suitup for quite some time. Joe would always come in and look at us and say, he and Al, “Good morning, space worker.” It was always a nice thing to hear from those guys. Joe asked me one day. He said, “Hey, how would you like to come along and be part of the team that suits the guys up and actually puts them in the spacecraft?” Insertion technician.

I said, “That’d be a lot of fun.” We’d go over to the trainers and Joe would show us the interior of the Command Module and where all the switches were, and how you should hook the guys up properly, a list that he would give us to study. After doing that for so many times, then you’d actually get assigned to a crew. We went from Building 7, and we actually moved to [NASA] Kennedy [Space Center, Florida, KSC] to work.

That was a neat thing. The supervisor came in one day—we’d been going TDY [temporary duty assignment] there—and he said, “Hey, anybody in the room here want to go to Kennedy and work?”

I said boy, that was a lot of fun going down there, I said, “Yeah, I’ll go.”

He says, “Well, when can you go?”

I said, “Probably this afternoon after work.” He looked at me like strange. I said, “Yeah, sure, I’d love to go down there.”

He said, “Well, go downstairs and get some travel orders. Go to the Nassau Bay Bank, get some money, and be on your way.”

I said, “Sure.” So I went home. I had moved back in after an event in an apartment. I lived in an apartment, got out of there. So I was back home for a while.

My mom said, “What are you doing?”

I said, "I'm getting the car loaded up. I'm heading to Florida."

"Today?"

"Yeah. I'm going now." So I went down there and I worked there from '68 till after Skylab. So working on Apollo 8, you got assigned to a crew member, and that way any time that crew member came in it was a confidence builder for them that the suit was laid out the last time like this, it was that way again, because Joe had really good detailed instructions for us to go by. He and Al Rochford had the background from the Mercury and Gemini days and knew what the crews wanted to see each time. Of course back in those days too we all had short hair, no mustache or facial hair because we were all military people, and that was our standard. We wore white shirts and ties all the time. So it was strict on how you dressed and presented yourself around the crew. It was a lot of fun. It was great working with Joe with all his experience, and a good mentor.

WRIGHT: You were also working with the Apollo 11. Tell us what it was like to suit Buzz Aldrin and then go out to the launch pad.

WOODS: Well, once again Joe was the lead NASA person on that mission. He asked me, "Would you like to be a part of this?" You have to remember that being on the team you put a lot of hours in. It wasn't just you go in there and work your eight hours and go home, because if you were supporting chamber runs you might start early in the morning; the different events that we had to support. They had the Flight Crew Training Building and they had a simulator: a Command Module, LM [Lunar Module], and they also had a full size Lunar Module there, and

also the lunar landscape. These guys actually did a lot of work. I can't believe how much time these guys spent training to go to the Moon. It was just incredible.

So you had the Class III training suits and you had the Class I suits that we kept in the O&C [Operations and Checkout] Building. We had another room for the Class III in that Flight Crew Training Building. Basically, as a backup insertion tech for Apollo 11, you watched Joe, helped him out with getting the prime crew in. Then the backup crew, it was your job to do all that work, and you would become the prime, so you would have to do the insertion. Being as nervous as I always was anyway, it was a lot of fun, but I'd always sweat a lot on the helmet putting him in there. Anyway, it was good to do that and be in the spacecraft, because you actually got down on the struts and moved around and put each crewman in at a time. You had the ventilators to deal with, and you always had to reach up in the tunnel because that's where the switches were, and know that from memory.

The next chamber, the right chamber, was the Lunar Module. To actually get in there with the backup crew and stand there and hook them up and watch the switches, you didn't hit something. So it was interesting to look back in time and say, "I was in the Command Module and I was also in the Lunar Module that went to the Moon."

In going out to the pad you had to support emergency egress training. Also S0017, and then final is S0007. During any of the emergency egress training, the fire department had something cool over there. It wasn't tunnels, it was—well, above ground tunnels. I was watching the guy one day, and he's got all the hatches open. It was quite a lengthy tunnel as well, so you'd have to go through with a fire extinguisher, and they had these little fire pits, you'd have to put out the fire. Well, I'm watching this guy, and he's got the doors open, and he's already got the flame things going. I'm going, "So what are you doing?" He said, "I'm

trying to get all the snakes out of here.” I’m going like oh no. So you were hoping you would be like the third or fourth group to go in. From that, you would go through the dress rehearsal of S0017 with the prime crew only.

I know probably a lot of you in here know this, but for all the prime crew, you had three suits all custom-made. You had the Class I prime suit, a backup suit, and you had a Class III training suit. Then the backup crew had a prime suit and a training suit. We had many many suits to take care of. The people that weren’t assigned to the crew, that was your job to go and backfill and work on those space suits as required.

The S0017, just like in the Shuttle, that was your practice run to go to the pad. It was interesting because Buzz Aldrin was flying center seat for liftoff, not Mike [Michael] Collins. When you got to the pad, especially on launch day, everything is fueled. Seeing the Saturn V was just incredible. You got up there, and you had to stand by the elevator and wait, because the flight room is so small. Joe walked around with Neil [A. Armstrong] and Mike to get them started, and I would wait by the phone in the elevator for the test conductor to call and say, “Okay, it’s his time to go around.” Buzz had moved over to the railing, of course they’re all suited, and looking over the side like this, you could hear that Saturn moan and groan, which was just incredible.

The only thing Joe forgot to tell me was when the fire pit would ignite. It was off in the distance. So we got Buzz around, and my job was to start carrying GSE [ground support equipment] back to the elevator. As I was doing that, I was coming across the swing arm, and all of a sudden this thing goes [makes ignition noise]. Holy smokes, it’s not time. So anyway, we got all the GSE back and the van went back to the fallback area, which was A11 roadblock, and watched the successful launch. That was a real treat.

Then I got to work again on Apollo 15, not as the backup. Then the three Skylabs and then we closed the lab down and came back to Houston. Then we went back to work Apollo-Soyuz [Test Project, ASTP], and then completely shut the lab down after that. But it was a tremendous experience to work all those suits and back other people up when they were the prime and actually working on the suits just doing all the maintenance. Removing zippers, replacing them, doing all the custom fit of the overgloves that went over to protect, the Chromel-R [woven steel], so it didn't get wear and tear on it that they used for the drills on the lunar surface. They all had to be custom-fit because of the custom gloves that they wore.

WRIGHT: What changes did you have to prepare for Skylab?

WOODS: I think we had a lot of changes for the Skylab. It was still the suits. It did go from the A7L configurations on Apollo 15 to A7LB for more mobility to get in and out of the lunar rover. They just made a couple things there. But we got to support basically what they called the CEIT [crew equipment interface test] for the lunar rover down in the high bay in the O&C Building before it actually was installed into the Lunar Module. So that was neat to have the guys suited and actually sitting in the rover, but it was jacked up off the wheel. Couldn't put it on the wheels obviously. But they would go through and cycle everything and make sure it worked suited. Then watch it actually get loaded into the side of the LM before they took it out to the VAB [Vehicle Assembly Building] for stacking.

WRIGHT: Couldn't figure out a way how to just slip in there.

WOODS: I would love to. I think like anybody else that supported the program, you might have never got on the ship, but you flew a lot. In your dreams.

WRIGHT: I guess when you closed down the building until ASTP was that an interesting feeling to know you were shutting those doors on all those suits and having a few years in between before you went back?

WOODS: Well, it was one of those things. It's like after the Shuttle Program. We were up to like 50, 60 people at ILC there supporting those events, the technicians, engineers. You have to remember back in those days it was always amazing to me to see the maintenance manuals come out of Delaware. Not based on computers. This was the real art of it. Everything those guys did up there was just unbelievable. We got a chance to go to Pear Street where they actually built the suits, the early ones. It was just amazing to see the ladies there that actually put those suits together. When we did start closing down, it's sad just like it is for the Shuttle Program. A lot of people that you worked with for many years, and you go your separate ways.

Anyway, we came back to Houston and started working on a lot of the things for development for Shuttle.

WRIGHT: Tell us about those.

WOODS: Some of the gloves and different things. We built that sphere. Walt [Walter D.] Salyer, Sr. and Walt Salyer, Jr., to name off some of the other folks that were in there. Jack [K.] Coverdale, Sr. was my lead, and Bob [Robert B.] Epperson. All those guys, we were in there in

that room together just at the sewing machines building anything that the engineers came up with. We built those rescue spheres, and all kind of stuff for the Shuttle Program. A lot of the crew-worn harnesses, the early development of that, and then they would be obviously turned over to another contractor to be built for flight. But some interesting times in transition. And building a lot of the stuff unsupported. Like the urethane bladders that were used. It didn't have a nylon backing. In those days we didn't have the vent hoods and everything that you have now, so working conditions weren't the best. But anyway we survived it and did some interesting projects.

WRIGHT: In '79 you left ILC and became part of the NASA federal community. You were talking about too that you were working with some of the ejection seats and the suit.

WOODS: Yes. Getting ready for the STS-1, I had an opportunity go to work for NASA as a suit tech there. Myself and Troy [M.] Stewart actually. He was one of the Air Force guys and came out of the MOL [Manned Orbiting Laboratory] program. He supported on Apollo 11, but he and I started basically the same day with NASA. So we were working with Jim [James O.] Schlosser, was our lead engineer for the ejection seats and the crew escape system for the first five flights. It was interesting. It's what we use now. It's a David Clark [Company, Inc.] based suit. One of the things that come to my mind, one of the training buildings, they had an ejection seat there. We were trying to figure out how you get that seatback angle. Because when you're in the Shuttle you would have been head down.

So to correct for that, we were coming up with inflatables, all kinds of things. They finally decided on pressurized shocks so that it would push the crewman forward and better in a

flying position. We were over there one day, and they had it all roped off. We're asking the guys what happened here. He goes, "Well, we don't know if the hardware has been deactivated." We were going like we've been sitting in this thing, and if somebody had pulled the handle inadvertently you would have gone through the roof of the building. I think they found out that it was deactivated, so we felt a lot better the next day when we went over there.

We actually built a system, Jim Schlosser did, so that if we were at the pad we could repressurize the shocks. That was the case when we went in on STS-2. The CDR [commander] had gone down some. It wasn't on its marks, and it was a nitrogen system. So we were able to hook that bottle up and actually pump it back up into the right position before we put the crew in.

We were out there doing pre crew ingress type work. Even though we had worked some zero-g stuff on early suits with Ellison Onizuka, he's just such a tremendous person, but he was our ASP.

WRIGHT: ASP?

WOODS: Astronaut support person on those two first missions. It was always fun to work with him.

WRIGHT: You got to be able to see the Shuttle launch as well.

WOODS: First one I was Joe's backup again. Then on STS-2, I got to do the insertion work. It was always so different because when we first went down there on STS-1 we were out there doing our first check. So it was first time we'd seen the real vehicle in vertical like that. I

always remember going in the white room. That's all you could see was Schlosser halfway in the vehicle looking in there and these cowboy boots sticking right up in the air. It was kind of funny. But yeah it was a lot of fun. Then the next three flights that I worked landing in New Mexico, and that was a real treat for us with all the gypsum everywhere. Then the next two in California, and then that's when I took the job in Florida.

WRIGHT: We've heard people talk about the orbiter and how it was affected from the gypsum, from landing at White Sands [New Mexico]. How were the materials that you were responsible for affected from being in that environment?

WOODS: It was really interesting from the point that when we got out to White Sands, Troy Stewart and I were out there. They would get these dust storms in the afternoon. There's I think one or two days that they were going to attempt a landing, and then they decided not to. Well, we were already staged, and you couldn't even see five feet in front of you. The gypsum would just blow like crazy on the high winds. So we would have to clean the van again, because it would actually seep through the cracks in the windows. It was everywhere. It had blown over some of the structures, the winds had picked up so high out there.

I'm not sure what it was like for the guys after we recovered the suits, but I'm sure they had a heck of a time getting that vehicle out of there with the cranes that they had to use, number one. Plus to deal with all the cleaning when it got back to Kennedy. It was quite a job. I know our suits, we had to spend a lot of time on those as well.

WRIGHT: If you would share with us a little more detail about the testing of the suits. You were in a new era with the Shuttle, so you had a new suit. As you were testing, I know you talked before about being I believe in the WIF [Water Immersion Facility], and you were taking the suits into zero g. Can you give us some examples and share some stories about what it was like to go through those testings?

WOODS: I think Brian [M.] Pacheco and Ronnie [Ronald L.] Newman were here when we first got the first Shuttle suit in. The one I do remember was that it had a long extension here. I think it was Story Musgrave. The body seal closure was way down here instead of up here. We had him in a donning station, and had a heck of a time getting him out because of that tunnel length. Then the next one we saw it had moved up. I don't remember if it was SP1, SP8, one of those suits. It was the first one. We would support the water tank with maybe Mr. [John W.] Young in the morning, Mr. [Robert L.] Crippen in the afternoon, and the next day [Joe H.] Engle and [Richard H.] Truly. So we were resizing at lunchtime. We really used the heck out of that suit, and even took it out to Colorado to support the MMU [Manned Maneuvering Unit] activities out there.

So it was a lot of fun. You got to see the early stages of what would eventually be the Shuttle suit. Just about that time I went back to KSC. I got a job opportunity there to work the GSE in Kennedy.

WRIGHT: Let's talk more in detail about that. What did that role involve? What were your responsibilities with that?

WOODS: Well, first of all it was one of those that they said, “Well, you go down and watch out for the EMUs [Extravehicular Mobility Unit] and that sort of thing, for stowage, V1103 testing with the suit with the vehicle. Just look over the stowage.” As it worked out, there was myself and Leonard Dikum [phonetic]. He was our TV engineer. Of course once again we didn’t have the computers or anything else. I would sit there late in the day typing TPSs [test preparation sheet] to get this work accomplished. It grew quite rapidly from there. At the end of the program we had nine people that worked for USA [United Space Alliance] across off site that was our support team, TV engineers and doing all the final packing.

One of the things that always amazed me—and it’s nice to go back and look at history in the Shuttle program. We always reference the document here which was written in ’77. It was the intercenter agreement between KSC and JSC on flight crew equipment. This was pretty much our standard throughout the program, because it defined what Houston would provide as far as documentation that came with hardware. Upon receiving what you did if you found a problem. Inform the JSC resident office, which was us. So it really was a really good document. It fed into the KSC system so well.

As we matured through the program, even down working with anybody that was our customer—I always said this to the guys that worked in our office—anybody that walks through the door, we want to be the host with the most. Everybody’s our customer. If it’s got an SED designation on it or SEG for when you got into station, that’s who we work for. It was a good policy to have, because somebody could come in late at night and say, “Hey, I just was delayed. I brought my hardware in.” Well, okay, we need to get it on the ship tomorrow. You were up against schedule in the suit room and in that lab. It was a lot of responsibility but yet the way we worked it, it managed a lot of hardware in a very unique way. Any time we needed help, you

went back to the people that were responsible. See some folks here from the decal lab and the importance that they played. When configuration changes were made by Gary Morgan and Ray Malone and company. It was just tremendous.

You didn't have any set hours, like we didn't in Apollo. We were just there. If it was 14 hours that day, so be it, you were there. Actually we were very successful over the years. If I remember right, we only missed like one cable in all those flights. That's the only one I ever had reported back to me. There was a couple close ones that we got down towards the end, and that goes back to configuration management. It's that handoff that was good. It was knowing the people that were back here that you supported and everybody that could make something happen there. It wasn't behind the computer. It was actually going to the facilities and talking to them and thanking them for a job well done.

Like our transportation people at Kennedy. We would actually go out there and talk to them every so often. Hey thanks for getting us that FedEx truck that we needed quick to get hardware back to Houston when we had a suit that they needed to look at, check it out, and make sure that the suits that we had on board at the time didn't have the same problem.

When you're doing your certificate of flight readiness you want to make sure that you have all your ducks in a row. You had clean paper. There's no guesswork to it. It was cut and dried. It was there. I know the people back in Houston, I couldn't imagine what they were going through when they would say, "Hey, we need the suit back," and we get the answer from somebody that goes, "Well, it's too late for a truck." Well, that wasn't the right answer, so we'd go to the Logistics Building and talk to another individual and say, "We can't fly without this. You're going to stop the mission." With that in mind, "Hey, Ron, we got a truck, it'll be there in two hours."

Let me tell you a couple background stories there. Early in the program, when you land at [NASA] Dryden [Flight Research Center, Edwards, California] all the hardware was left on the ship except for the early return bags, the med [medical] kits, flight data file, that sort of thing. Those came back on the STA [Shuttle Training Aircraft] with the crew. The rest of the hardware went back on the ship in place. They did a weight and CG [center of gravity], and we'd get it back at Kennedy. So you had like two-, three-week delay getting hardware off and back to Houston. Then they decided well, let's do the smart thing. Let's take it all off at Dryden, and then those things like EOS [emergency oxygen system] bottles, that sort of thing, anything that's pressurized that's going back to Kennedy, we would put it in certain cushions, put it back in the shop, and off it would go with the weight balance hardware.

We really cut a lot of time out of the processing when you're flying eight times a year. So it was really tough to manage all of it. In our lab, some guys came up with these ideas, we used bread racks. Rollaround bread racks. It was a beautiful thing, because you would mark each of them, color-coded, and you might have one that's all these racks supporting CEIT [crew equipment interface test], the next rack you might have for S0017 or the next one a download from a mission. So that's how we separated everything.

Basically we had the philosophy in our lab, it was just all a bond room, even though we had a caged area where we kept items that weren't in the flow at that particular time. But basically it was a big bond room, and it worked very well for us.

Then also streamlining documents that we had between early ISS [International Space Station] when we first got the hardware, there were a lot of steps to get it to the ISS Program and we found that our step was three. Houston, our lab, and the ship. From the ship back to the lab

back to Houston. We finally made some changes on the other side of the house that got it there. It was almost as crisp as our system in our lab.

WRIGHT: Is there a time that you remember that technology helped you streamline even more? I remember you said before you typed, you wrote, you hand-delivered. So did computer processing and barcoding, at what point did you feel like technology was helping you?

WOODS: I think when we did finally get computers—we had some guys in the office that had already been using them at home. Just like our TV systems, we were able to put everything in there as far as the TPSs go. Manage them better that way. We had our own tare station, which was good, because we had books that we would go look at every morning. That was the first thing I did, go look what's open, what PRs [program requirement] do we have. Then we would have a meeting every morning with Bud Hicks [phonetic] and Billy Luttrell [phonetic], all those guys that would orchestrate everything that we did. They didn't work for them, but everybody did work for them, because they were the ones that said, "Okay, you got to be at the pad with the suits at this time, this particular locker." We'd have a big map. "This locker has to go in. We're waiting on an experiment from Dryden for this one. You need to tell those folks that they have to be here at this particular time. They have 10 hours' worth of work to do in the lab." Those guys did every bit of it. It was just incredible what they did.

But the computer system was a big advantage for us. Plus, we did have operational agreements between organizations, which before we were shipping almost like across the hallway. So we got rid of that, because when you put a payload in the vehicle, you do it by an operational agreement [OA]. You didn't ship say a Spacelab to USA or Lockheed Martin and

say put it in the vehicle. No, it was just done by an OA between those two organizations. Then all your OMIs [operations and maintenance instructions] and TPSs would actually hook it to the vehicle. Well, we got to the point where we could do that between Station and ourselves, only for the integration and deintegration process. If it was going off site you had to do the shipping. But we kept streamlining it like that. It worked out very well for us.

Let me do a go back on this getting hardware in. One of the things that came up one day was when a guy calls me from the warehouse. If you ever looked at the LC39 logistics facility, it's pretty wide loading dock. Very long. One end of it is receiving. All of our containers were marked do not open. They knew that. It was coming to the lab, so they didn't have to do a receiving there. Receiving was done in our lab by our own logistics. That's what made it really advantageous, more so than other areas.

Anyway, the guy calls me up and says, "Hey, you got to come out here and look at this blue suitcase." We were waiting for an LTA [lower torso assembly] to come in so you could finalize after V1103 the configuration of the airlock and close out. So he's telling me about this, and he says, "Well, the winds kicked up. Bad storm coming through. We really had some strong winds."

I said, "Yeah, tell me what happened."

He said, "We're standing here by this big double door. There was this suitcase." You can imagine all these guys ran out the door and they're chasing this suitcase down the loading dock. It went like this off the end of it. So we got in the truck, took it back to the lab.

Of course we had all the EMU guys online and said, "What do you want to do with this?"

He says, "Well, what does the plastic look like?" So we look at it, and it had creases in the pink poly. So they said, "We want it back."

We'd already started the PR [purchase request] process. That was good having the logistics there, because we could move hardware out of our lab with a PR condition usually in less than two hours. It was to the warehouse and ready to take to Orlando [Florida]. The guy said, "Well, you have your credit card. Why don't you hand-carry it?" So I did. Off to Houston I went. They worked off site overnight on it. I hand-carried it back the next day and got it stowed, so the mission went off on time. But a lot of things like that happened over the years. You go like wow, that's really close.

We had another LTA out there. We used to tell them, "Your configuration management has to be in the lab. That's the wrong time to do it when you're basically at the pad doing your stowage. You do it all by documentation. Prepacks in the lab, and then you stow, affix it to the orbiter out there." We had some quality guy that wanted to look at the parts tag inside the LTA cover. As he did that, or directed the technician to do it, the zipper broke, so they brought it back to the lab. First you go through what would the EMU guys ask? Well, first of all is it a planned EVA [Extravehicular Activity]? It was no. If it was, was it going to be resized on orbit? So it was all these no no noes. We got our Nomex thread out with their approval, whipstitched it all closed, edge-locked it, and off it went back for closeout. So we had a lot of little things like that over the years that would bite us a little bit, but fast recovery.

WRIGHT: A nonstop as you mentioned 24/7 for years back and forth from Kennedy to Houston and back. You transferred yourself back and forth and worked in a lot of different areas. What do you feel has been the most challenging aspect of working in this field?

WOODS: Maybe developing the communications with everybody. I've always taken the approach that I don't care where you work, I think you should always try to know as many people as you can. It's always been a goal of life to make sure you get out there. Like I said with logistics, wherever they're at, it doesn't matter. Make sure you know who that person is. Because it really did, it helped us a lot over the years in that form of communication.

WRIGHT: That's another good lesson to share. You talked about doing it right the first time and having good communications. Do you have others that you would like to share that you feel are just good items to remember as you work through these processes?

WOODS: Well, I think another thing too is when you start doing processing, like we were doing there, with so much hardware, to make sure that you—and we were doing this way before lean team was the talk of the town or some of the other things that NASA has—you got to make sure that you streamline, you do that handoff properly. You can't assume—and we saw it so many times in the Shuttle—that it's out of my hair, it's gone to the Cape [Canaveral, Florida]. So many times—when we were sitting here and communicating back and forth. Like side view cameras when we had an issue, and it was that quick response. Well, okay, so out of the six you got a bad nut plate. You run it over to the machine shop because you know those guys and the PR is being written as you go along, because it's got to go back in on second shift. It's that kind of a process, that you're always thinking about what if, what if, to make sure that when it comes to what if that you react to it and make it happen quickly. Hopefully one of these days maybe we'll have another Shuttle. It's a great machine. Good processes.

WRIGHT: Well, let me shift a little bit from how you took your interest and your skills and put them into a different aspect of your life. Let's talk a little bit about your paintings and your interest in artistry and how you captured your experiences on canvas.

WOODS: I always thought that especially when you were working early in space suits, I was always amazed when you'd pick up a helmet and you'd see that Air-Lock label on there. Like who made this, where, the brilliance of some of these engineers. Just like the people in this room here. You look at the pioneers of Mercury and Gemini, and then I had a chance to work with them, and going back and asking the questions, "What is this?" Look at all the fine-tune of the stitch marks through there. Relating back to the ladies that used to come down from Delaware when we'd get in a bind, we couldn't handle all the work. So they would actually send several ladies down to Florida, help us change out zippers on the A5, 6L, 7L suits. It wasn't that bad on an A7LB, but the others were just unbelievable, how much time it took just to do that. Seeing as they were the experts, we could do it, but not like they did. Those ladies were just incredible.

Just to see how that stuff is all fine-tuned and just the artistry of it. I was reading something here. I'll see if I can find that name. We can find out the author of that and send it out. It was piece like if Leonardo da Vinci lived today and what he thinks of art and engineering, and it just goes hand in hand. It's just incredible.

When I started college, I was going to be an architect, and found that very difficult. I couldn't do the ink drawings because it would splatter. I said this is nuts, I can't do this, so I said well, I'll just change to art. That's what I did, and mostly did pencil for years, and then I bought a little Prang watercolor set one day at the store. I said I'll try that. It had a brush with it and everything. So that's when I started doing watercolors. I taught myself to do that. I was taking

still just pencil work in college and finally finished 11 years later over here at U of H [University of Houston] with a degree in art. It's just been a lot of fun.

People say, "Well, you see that all the time." Things get so hidden in books. It's like the Gene [Eugene A.] Cernan here, Apollo 17. It was from a brochure that NASA had, a book on Apollo 17 or Apollo. I always just thought it was fascinating. If I did suit him up, I don't remember, or maybe I worked on his suit. But being the last guy on the Moon, I'm going like wow, it just can't be locked away in a book or somebody's drawer. It has to be out in the public. That's when I took those photographs back in the '70s where we had all the suits lined up. I know somebody else took one. I never knew it even existed, but the one I took was the one I did all the suits, but the neck rings were missing. The reason the neck rings were missing, because HS [Hamilton Sundstrand] was building the hard upper torso with those same neck rings the way they were manufactured. You look back at that and you go like well, we want to make sure that somebody remembers why that was missing off that suit.

We were taking these parts and pieces and developing new hardware with it. That was called *Hanging Around after a Walk on the Moon*. Then I did some gloves on a shelf. One with Neil's [A. Armstrong] name with a glove sitting like that. *I Don't Think We'll See Flight Again*. I got to talk to him about that many years ago. He says, "Yeah Ron." He says, "That's pretty cool. We don't get to fly like we used to." It's those things that are just treasures to me that you want to make sure that it's out there. Of course space art is a hard sell anyway. It's not something that everybody has in their living room or their den, but it's still a lot of fun. I do it just as respect for what was out there before. I like to capture that. That's what led me to do that.

WRIGHT: Thanks for that. Well, as we start to come to the close of our session, I wanted to of course leave some time for questions. But I thought you might have some thoughts since you've been around for four decades, a little more than that, and you've seen programs come, and you've seen them close. As NASA starts to look forward to its next level of exploration, what type of advice or what kind of suggestions would you give to the space suit technicians and the people that are coming up in your field?

WOODS: I just look at the people that are involved, especially in the building where I work now. I had the great good fortune to come back and work with some people in that CTSD [Crew and Thermal Systems Division] again. It's just amazing what they're building. You go in these different labs and you see these engineers in Amy's group and the PLSS [portable life support system] people. First time that this has been done in many many years. It's just incredible to see the new hardware and technology, the materials alone. Looking back at what we started with and how complicated the custom suits were of Apollo, where you had cables running everywhere, and the dipped rubber goods. Now it's all based on different materials, for axial where you have webbing as opposed to all this other complicated material.

It was another thing. I always liked reading. I found this. It was a poster many years ago. With all the pioneers that we have in the room here—and you are the pioneers of the future. But it says, “Someday I would like to see you stand on the Moon, look through a quarter of a million miles of space, and say to yourself there certainly is a beautiful Earth out tonight.” So I really do, I hope someday we get that drive I guess, or can maybe soothe some of the world issues by going back to the Moon, putting another American flag on there. I think it'd be a great thing for this country to do.

I always think of people saying well, there's not enough money. You wonder when people say well, there went another million dollars. It never left the Earth. It all stayed right here. It's fed back into the communities and the people that actually worked on the hardware. All these companies and individuals, especially all these people here in this room. It's a cycle that I don't think we should stop.

WRIGHT: Well, I think we'll end for now. We'd like to thank Ron for all of his great experiences and open it up for some questions. He's agreed to take some of those. Is there anyone that has a question they'd like to ask?

UNIDENTIFIED: I've got three questions actually. In Apollo 11, on launch morning you see the three astronauts in their suits carrying their ventilators. You see Joe Schmitt walking behind them. Where are you when that happens?

WOODS: When you're coming out of the building there, I was over on the right-hand side all the way in the back. You know Al Rochford. I asked Al one day, I said, "Why is Joe always in the pictures and you're not?"

His answer was "Well, Joe always puts his hand over my face." That's how he got there.

UNIDENTIFIED: Second question. STS-1 launched April 12th. On April 10th they tried to launch and I believe had a launch-entry suit problem that contributed to the delay from that day. Do you remember the details of that or can you relate some of that?

WOODS: The problem that I remember—and I was really sweating bullets that day—was there was a hatch there inside. It was like on the older helmets where you could take off the cover. It was hatched, sealed off. There was something in our procedure where you had to test that, but it wasn't closing properly, and we didn't find that out until after that you actually had to go back inside of it and push it. So during our preflight test. But anyway instead of knowing to push that into place and do the final pressure test, manned suit testing, they said change it out. So I did right there on the floor. Anyway, we got it accomplished but then after the fact we found the issue.

UNIDENTIFIED: Last item was before STS-1 you were staying in the Econo Lodge. Nearby the Econo Lodge you noticed a large flagpole. A story you can relate to us?

WOODS: Yes. We borrowed the flag with permission. We had taken that and in that room we just had the two La-Z-Boy recliners there. Then we actually put the flag—it's huge—and hung it, and then had it draped over some of the pack tables there. So when Crippen and Young came in for that mission, they looked and went wow, beautiful.

It's like what we did with the launch-entry helmets that Jim Schlosser had worked on and put the dual microphones. They had the NASA worm, which was very sad, but they wanted the meatball. So we had actually done some really el cheapo watercolor. I don't know what happened to them, but showed them what that would look like, and they all agreed. I tell you, this is great, put it on the back of that helmet. That's how that got there. Schlosser sent it off. The worm was on the side of it and real small, but it had that meatball on the back. As a matter of fact when we went out for closure on STS-1 and then we got scrubbed, Joe and I had the

NASA meatballs on our closeout clothing. We got back, and this guy says, “Hey, you guys are in trouble.”

We said, “Why?”

He says, “You got the meatball on the back.”

We said, “Well, we were told to do that.” Anyway, we mentioned a couple names. Last time we heard of them. They never came back. He said it, you’re good to go. So that was nice to see the meatball come back.

WRIGHT: Did you have other occasions where you sketched up or drew drawings that helped along with the suit development or evolution?

WOODS: We did, when we’d actually have to mail those up to the ILC. Not much, but some of the things. They’d say hey, can you draw this out, and we’ll send it up, with some Polaroids or whatever else they had. But not a whole lot. Then when we started working over at what was ILC Space Systems for a while, I worked over there. We were actually doing some drawings of different pieces of hardware.

WRIGHT: Someone else have a question?

UNIDENTIFIED: Are you still doing watercolor, or are you using other mediums on your paintings?

WOODS: No, I'm doing watercolors. I just got back. I did a couple pieces in acrylic. Then this I worked on over the weekend, so it's stage four of that one. That's the second time I sanded it. I started over because I found my reference material when I took that in the Smithsonian [National Air and Space Museum, Washington, D.C.] at the [Paul E.] Garber [Preservation, Restoration, and Storage] Facility. That's the way [Charles C.] Pete Conrad's suit was. Amanda Young had pulled it back so we could take a look at it. I just thought wow, suits that you worked on many years ago. That's his suit number 614 Skylab suit.

UNIDENTIFIED: That's oils, right?

WOODS: This is oils, yes. So I'm working in all three of them. Yes.

UNIDENTIFIED: When you're going through insertion on the day of launch, I know the time is very structured and it's very tight, and you rehearse over and over and train. Is the conversation very structured or is there any levity? Is there some chit-chat?

WOODS: There is. Like when we were closing out on STS-2 and Onizuka was our ASP, you're working with the guys to finalize the suits, because actually with ejection seats you have to get in there and put their heel clips into position. Everything. It was a lot of work to do that. You had the set procedure, your checklist. I just remember El sticking his head up over the background and going, "Don't mess up." Yes sir. That gets you back on the straight and narrow there. But it was structured. You had platforms that you had to help remove and make sure that all the cue cards were in place, and watch where you walked. It was a tight ship. I can't imagine the guys

like [S.] Jean Alexander and Rochford and all these people that transitioned all through the years, and the USA technicians that actually came to the Cape and did that work. I was used to doing two people, but when you started doing seven, my gosh, even though there's two technicians. But in that crowded vehicle, that's just incredible.

That was what always amazed me. Whatever happened in the counts, you always had room to stuff that flight crew equipment in. You might get delays and delays. They say, "Okay, well, we were going to give you six hours, but now you have four." My hat is off to those technicians, for all those years, Jimmy Blake [phonetic], John Beaker [phonetic] and Dave Andrews [phonetic]. I used to leave work, driving on 528, and it might be 9:00 at night, and here's Dave sitting in his Dodge truck at the red light just coming out of work. Talk about dedicated people. It's just incredible.

But 8,000 pounds of hardware or so, whatever it was in that vehicle, plus all the camera systems that we had. The ABCD [phonetic] and the elbow and the wrist cameras, and the sensor packages later on, and the coordination it took. Even the GSE that supported all of it that had to be custom-made for that so that when you lifted the sensor packages that nobody could do other than lift it right straight up. You couldn't move it, because we had a problem with a stop on one of them one time. To get all that right was a big effort.

UNIDENTIFIED: Who were you assigned to on Apollo 8?

WOODS: Jim [James A.] Lovell. I think Dave [David R.] Scott on [Apollo] 15. I don't remember. Owen [K.] Garriott. But then of course after when you're doing the Skylab, all the things that you used to do over in the Flight Crew Training Building, all that went away except

for the command module simulation. They can go over to train. One other thing. Some of the guys when they came out of the MOL program, Frank Hernandez and Troy Stewart and Byron Smith. Byron was a real jokester. He was underneath the trainer, and we had a way we could do pressurization and liquid cooling. So he waves me over and he had cut off CDR water. He said, "I got to go out for a minute. Here. Watch this."

I didn't look at the flow meters or ask him even. I just knew they weren't pressurized. So I put the headphones on and couple minutes later it's like "Suit tech."

"Go ahead."

"Who told you to cut the water off?"

"Don't know what happened, sir. It's back on, sir."

"I'll tell you when to cut the water off, damn it, listen to me." You could see Byron over there laughing. Gotcha. He was good when you had the suit pressurized to like eight psi, to come behind you with one of the surgical pans that we used to clean hardware in and just drop it behind you. You want to tear the console down.

WRIGHT: I'm sure you never played any pranks.

WOODS: No, absolutely not.

WRIGHT: You don't want to confess any, that's it.

WOODS: Right.

UNIDENTIFIED: Ron, I would like to know who was the most influential person in your life and why.

WOODS: Probably my mom, because she's the one that told me about the job out here.

UNIDENTIFIED: And taught you to sew.

WOODS: Taught me to sew, yes. But no, I just look at everybody that I've ever known. It's really been an honor to work out here, but just the people themselves over the years. It's just tremendous. To see different faces come into the flight crew area down there on a fact finding mission, or looking at their hardware and knowing that hey, if you ever need anything we're here. Call us and we'll help you out.

WRIGHT: As we've gone through the suit evolution, I didn't get a chance to ask you about the impact on your team after the [Space Shuttle] *Challenger* accident [STS 51-L].

WOODS: Well, what we did after—I know here in Houston Tim [Timothy E.] Pelischek and those guys were working on the crew escape pole. They had to come up with the launch-entry suit. So at that end we had things we had to do to support that, and to reactivate the Apollo suit room. We had used it for a staging area early on. It was our flight crew area. Then we went to the VAB for like nine years and then finally wound up in the Space Station Building. But we had to go back and put a contract in to build the consoles. We actually used the existing plumbing that was used from Apollo and the bottle bank downstairs. It was a cost-effective way

to do it. Then we also had the charging of the EOS bottles, so they had to put in a program requirement document, ESR [engineering support request], to have life support support that activity. So there was a lot of things we had to do differently, but the mechanics of that document, the intercenter agreement, was always so helpful to us because we could reference that. Whatever the hardware was, this was what you needed to support.

Then it melded in with our paper system that we had already for doing the locker stowage or shipments or anything else. The TPS system and PR system. Then we had Bill Allen [phonetic] come down, and he was our suit engineer, and he had all the books that were approved procedures from USA or anybody else. Then we would take that and write our TPSs. So we had a good system. It worked out well for us.

WRIGHT: More questions?

UNIDENTIFIED: You worked with a lot of different suit designs hands on. Is there anything that jumps out at you as a feature or where we should head with mobility? Or something about disconnects? Anything at all that you observed?

WOODS: I don't know. I think from what I've seen over in Building 7 already it's just incredible what the young engineers are doing. The teams that Amy works with and Dustin [M.] Gohmert's team and the PLSS team. I always take the philosophy of just try everything. Don't limit yourself. Look at Peter [K.] Homer. He came up with a different glove design. So I think anything you try is worth a shot at it. I don't know of any particulars, or I can't think of them offhand. I still think with newer materials—and don't throw out the old hardware. Look back

on some of the Apollo hardware. I was looking at it the other day. That thing is 40 something years old, and you put an elbow connector in there, and it still locks down perfectly, and just works great.

UNIDENTIFIED: Could you tell us a little bit about each of the paintings behind you? A story?

WOODS: Well, see, this one here. This represents a payload bay flag that was early. It's a 101 ILC type number. We had this hanging on our wall, plus another large flag that one of the crews had flown for us. I always liked the way that when they applied the Velcro to it and you did the stitching it wouldn't wrinkle the fabric. It was just a beautiful flag in our lab, so took a picture of that. These are the pictures I took at the Smithsonian of Jack's boots. I did the watercolor first, then tried in oil, and next time I'm going to try it in acrylic.

This one here, of course one of my favorites, of Gene Cernan on the Moon with the flag. That's an original watercolor. This one over here, once again that's Pete's suit number 614 in the Garber Facility the way they had it. Then a couple years ago I did this one here. Went out and photographed [L. Gordon] Cooper's suit. This was in the [Kurt H.] Debus Center in Florida [KSC Visitor Complex]. It's amazing. There was a big poster of Pete Conrad up on the other wall. I wasn't trying to put that reflection in there. I think I was shooting it straight on. But anyway here's this reflection of Shepard in there, so it's the first guy and the last guy in the Mercury Program. I call it *The Reflection of Shepard*. Most of this stuff here, it'll be because it's a real fine watercolor. You do it with a magnifier, so you really get some good detail with the hardware. I love working in any of the mediums. It's a lot of fun.

WRIGHT: Contrary to rumor, these are not door prizes. They are not door prizes.

UNIDENTIFIED: I was fortunate enough to get one of your prints about 25 years ago. What's available today?

WOODS: Well, my Web site is not good. But hopefully it will be soon. There is a place across the way there in Nassau Bay that was accepting some of my paintings in there. But if you want to talk to me about it too that's fine. I appreciate the interest.

WRIGHT: Is there another question, comment?

UNIDENTIFIED: Did you have a favorite astronaut that you worked with over the years?

WOODS: Well, several of them. They're all great to work with, but like I said Ellison Onizuka was a favorite. He was just such a funny guy to work with. Individual. No matter where you were, if he spotted you, he'd always stop and say hello. Jerry [L.] Ross is another one. Any time I'd see him he'd always go, "There's trouble." Yes sir, it is. I don't know. There's a lot of them. Vance [D.] Brand was always a very good guy to work with. I just remember the first suitups I ever did. It was Al [Alan L.] Bean. We'd already got him in the suit and the gloves were lying there, and com cap on. So I picked up the left glove. He had his comfort glove on, so I was going to put it on. He puts his hand down, and he puts his right hand up. Being a rookie, I took the glove, and I set it down, and I get the other glove. I go to put it on, and he goes [raises

his other hand] and I'm going like, "Okay." Then he starts laughing about it. We finally got him suited. He was good.

UNIDENTIFIED: One more comment. Ron, I'm struck by the number of names that you've just thrown out like you know all these people, and I know you do. It really is amazing. I know there are hundreds if not thousands of people that have worked with you over the years and really appreciate the obvious dedication that you have. So thank you very much for what you've done.

WOODS: Well, thank you. Like I said, anybody I've ever worked with, it's always been an honor and a lot of fun. We do. We have some good jokes and I appreciate that very much. One other thing. Billy Luttrell [phonetic]. You talk about people who orchestrate and put things together really well. I don't know how many of you knew Billy Luttrell, but just the funniest guy. He looks like Sean Connery a few years back. We're in a restaurant in California, and one of the ladies there kept looking at him. So Billy gets up, pays his bill and he leaves. So I notice, and I said, "Ma'am, do you know who that was? Sean Connery."

"Really?"

I said, "Yeah. I think he's going in the bar next door." Well, sure enough she goes in the bar looking for him.

So Billy, being the ops guy, he was always right there in the front of the room. We had a couple of Center Directors come in one day. One of them didn't always have the best sense of humor. The other one was great. As a matter of fact, he was the JSC Center Director. I'm

nervous about them coming in there because I'd never met the guy from here, even though I'd worked for him.

He came in and we showed him around the lab. Billy puts his feet up on his desk, and he's got this sign up there that says, "God, I love my job." He sets it right here, and he's like he's asleep. Well, out walks the not so friendly person, and looks like this. Out comes the next one, and he kicks Billy's foot and goes, "I wish I had your job, buddy."

Then the other thing he would do. A lot of times you would get all this hardware loaded up, the guys and flight crew, and out they go to the pad. Get out there, well, something happens they can't do the stowage. Well, Billy sends these guys out to the pad to do the stowage. He gets a call, and they're already halfway there. You can't do the stowage, we got to shut the white room down or do something. He's going oh, no. So he runs inside the lab. He gets this cheesecloth, it looks like gauze, and he wraps it around his head, and he goes in the break room. He goes in the refrigerator and gets the ketchup, and he pours a little dab of it right here like he's been wounded. He sits at the ops desk like this. The guys walk back in, and go, "Billy, what happened?"

He's going, "Don't hit me again, please." But anyway, we always had a lot of fun in that lab. Of course after making 32 trips to Dryden as well, seeing the Shuttle land out there, and doing all that work too, it was a lot of fun. Thank you all. I really appreciate you coming over here today and listening to me. Thank you very much.

WRIGHT: One more. Did you want to ask real quick?

UNIDENTIFIED: You mentioned Al Bean. Have you ever been able to visit with him about painting?

WOODS: Yes I have.

UNIDENTIFIED: What was that like?

WOODS: Well, my first event was I had some stuff in Building 7 back after Apollo. I think he was moving that direction to be a full-time painter, and he came and he gave me a few pointers. Then several years ago once again I got to show him, I believe it was this one here. He's such a great guy to talk to. He told me. He said, "You know what? You need to stop using so much black." So I took his advice, and now I put a little blue in my black. So anyway I'm getting there. But he's a tremendous artist. I have one of his prints, *The 25th Anniversary of Apollo*. I don't know if you've ever seen it or not but it's incredible. Around the side of it it's got all the mission patches. I think it has 19 original pencil signatures on it. But just beautiful. Yeah, I really admire him for all the work he does. It's tremendous. It's all acrylic that he does.

[End of interview]