# ORAL HISTORY TRANSCRIPT

GERALD P. CARR
INTERVIEWED BY KEVIN M. RUSNAK
HUNTSVILLE, ARKANSAS – 25 OCTOBER 2000

RUSNAK: Today is October 25, 2000. This interview with Jerry Carr is being conducted in his home in Huntsville, Arkansas, for the Johnson Space Center Oral History Project. The interviewer is Kevin Rusnak.

I'd like to thank you for having us into your home today to do this interview. If we could start out, please tell us a little bit about your background and some of the interests you had before going into college.

CARR: Well, I was growing up in Santa Ana, California, and I had always been interested in technology and that sort of thing. At about age fourteen is when I really was infected with the love of aviation. Back in those days we were looking at World War II. World War II had just completed. We had seen a lot of airplanes, experimental airplanes, flying over Southern California, brand-new airplanes.

What is now the John Wayne Airport out there was called Orange County Airport, and the Martin Aviation Company, this was the brother of Glenn [L.] Martin, but anyway, Martin Aviation had a bunch of old Taylorcraft there. One of my chums from Santa Ana and I used to ride our bicycles about fourteen miles from Santa Ana down to Orange County Airport and we would wash airplanes all Saturday morning. Our pay for that was a twenty-minute flight in an old Taylorcraft. So that kind of began my interest in aviation. I should say I really became totally infected by it by then.

My early years before college, in high school, I played high school football and was in student government, was very active in the Boy Scouts and did a lot of work right up to my senior year in high school as a junior assistant scoutmaster, but spent many years in the scouting program and got a lot from it. I was an Eagle Scout with several palms, and just thoroughly enjoyed that whole program. Had a very busy and very happy high school career, really enjoyed it a lot.

Moved on to University of Southern California. I did that through the naval ROTC [Reserve Officer Training Corps] program. I had gotten an appointment to the [U.S. Naval] Academy [Annapolis, Maryland] and also was accepted into the naval ROTC program. That final year, my senior year of high school, I was a naval reservist as well. I was a plane captain, a seaman apprentice. I used to go to Los Alamitos Naval Air Station [Los Alamitos, California]. My responsibility when I was there was an [Grumman] F6F *Hellcat*, and my job in the morning was to get out and clean it all up and make sure the gas and oil were in good shape, and then the thing that I really liked was the opportunity to start it and run it and warm it up. Those were my "pre" years.

The thing that got me to a place where I chose the naval ROTC was my commanding officer of the naval reserve squadron there. Here I was a high school senior with two opportunities: I could go to the Naval Academy or I could go to the naval ROTC at the college of my choice. At the time I had an opportunity to go to USC [University of Southern California, Los Angeles, California], UCLA [University of California – Los Angeles], or Cal, so I went in to my commanding officer and told him of my opportunities and asked for his advice. He was a Naval Academy graduate, but had left the regular forces and was a reserve officer at the time. He thought about it for a minute and he said, "Well," he said, "if you really want to go Navy,

then probably the thing to do is to go to the Naval Academy, but," he said, "if you intend to go Marine, then you should give serious consideration to the naval ROTC. The reason why is because in the Marine Corps they don't care where you came from, whether you're an Academy graduate or not." He said, "Also, why should you lock yourself up in the Bastille for four years when you can go to a college with girls for four years?"

So I thought about that for a while longer and then decided that maybe his advice was the right advice. So I elected to accept the appointment to the naval ROTC at the University of Southern California.

So my college years were, for the most part, I started out as a math major, very quickly realized it was too academic for me, and that I really wanted to be an engineer. I shifted into the mechanical engineering program at the University of Southern California.

I played one year of football for the Trojans as a freshman, and I was the smallest man in the entire Pacific Coast Conference. At the end of that season, I realized that if self-preservation was going to be any kind of a factor, I'd better quit playing football, because the guys that I was up against in those days were people like Frank Gifford and some of those kinds of fellows. USC in those days was kicking out a lot of All Americans, they were pumping out a lot of All Americans, and they were also playing pretty high in the national standings.

So I then dedicated myself to my fraternity, which was Tau Kappa Epsilon, and to my studies at the university and to my career, my naval career with the naval ROTC. I was made the battalion commander of the ROTC battalion my senior year, and I graduated with honors from USC with a bachelor's in mechanical engineering.

That's about it up to and through college.

RUSNAK: You mentioned that if you wanted to go in the Marine Corps, that the ROTC route was a better one. Had you always intended to be a Marine?

CARR: Well, having grown up very close to the air station at El Toro, I had a feeling that I really liked the Marine situation. I really didn't commit to the Marines until I was a junior in college. The person who really convinced me was the Professor of Naval Science, a Marine Corps officer, a lieutenant colonel. He was really a very, very fine man, a man that I really admired, and he convinced me that I really ought to go Marine.

But the interesting thing was, he said, "Why don't you stay Navy until you finish your junior year and then make your Marine option selection when [you] come back from your junior cruise," because the junior cruise was a cruise on a naval vessel, a cruiser the USS *Worcester* [CL-144], and we had a wonderful midshipman cruise and I learned a lot about the Navy from that cruise. If I had not done that, I would have gone to Quantico [Virginia] to the basic school there to get some officer training. He said, "You'll probably enjoy going to sea, and that will also probably convince you without doubt to be a Marine." And he was absolutely right.

I had a wonderful midshipman cruise that year, got to see Norway and Denmark, had a wonderful cruise. Came back, took the Marine option, and became a Marine second lieutenant in June of '54.

RUSNAK: Was your intention to get into aviation in the military?

CARR: Yes. Yes, it was always my intention to get into aviation. They wouldn't allow you to go directly from the university to flight training; you had to go through what we called charm

school, what the Marine Corps called Officers' Basic School. So when I finished at the University of Southern California, they sent me to Quantico, Virginia, and I spent the rest of that year of 1954 in officer basic training.

Came home for Christmas in California, then went back to school for one more month of what they call postgraduate training, which was mainly a lot of administrative training, how to do a lot of the administrative work, and then from there I had known then that I was selected for flight training. From there in January we left the Quantico area and went down to Pensacola, Florida, and we were in Pensacola there in January of '55.

My first daughter, Jennifer, was born in July of 1955, in Pensacola, at the naval hospital there. I must say that one of my fondest memories of that, when I first saw Jennifer, was that she came in on the arm of a great big burly Navy corpsman instead of a little white-frocked nurse, and it was quite an experience to see my daughter come in on the arm of a big corpsman.

RUSNAK: That sounds wonderful. A nice way to come into the world, I guess.

CARR: Yes.

RUSNAK: So tell me some about your flight experiences as a Marine aviator.

CARR: Well, as a Marine aviator, I finished and got my wings at Kingsville, Texas, in 1956, in May, and was sent to Marine Corps Air Station Cherry Point, North Carolina. I was processed in there, and after a few weeks I was assigned to [Marine Fighter Squadron] VMF-114, which in those days was flying the old [Grumman] F9F-8 *Cougar*. Shortly after that, about six or eight

months after I joined the squadron, we were assigned the [Douglas] F4D *Skyray*. So we flew that for several years.

I was in that squadron for about three years. My final part of that tour of duty was a Mediterranean cruise. The Marine squadrons must be carrier-qualified, and we did a lot of practicing in getting ready for carrier work. We went aboard the USS *Franklin D. Roosevelt* [CVA-42] and went to the Mediterranean.

It was about four months into that six-month cruise that I was informed that I had been selected for U.S. Naval Postgraduate School at Monterey [California], so I left the ship in about August, I think it was, and reported to the Naval Postgraduate School in Monterey. I spent two years there studying aeronautical engineering, and that was really murder, because it was four years of college crammed into two, and what they did is they took out all of the English and the economics and the history and it was just all math and physics and aeronautical engineering. It was a tough, tough course.

Finished that in two years, then was sent to Princeton University for a master's degree in aeronautical engineering in stability and control of aircraft, and was very, very fortunate to have the opportunity to study with, I guess, the man who has been called the father of the study of aircraft stability and control. His name was Cortland [D.] Perkins. The books that he has written are still being used today, I believe, in the study.

After that tour of duty when I got my master's degree, I was then assigned to the Marine Corps Air Station Beaufort, South Carolina, and was assigned to VMF-122, which was at that time flying the [Vought] F-8 *Crusader*. I flew the *Crusader* for several years. Again, it was about a three-year tour of duty. I was very fortunate. Most guys don't get three years.

My main duty, because of my background in engineering, I became the maintenance officer of the squadron, and I was in charge of not only flying my share of the flying and doing that sort of thing, but it was also my responsibility to run the department that kept the airplanes flying. That was a real challenge and I really did enjoy that kind of work.

Flew with 122 for a couple of years in the U.S., and then was sent to Japan. The squadron was deployed overseas to Atsugi, Naval Air Station Atsugi, Japan, which is just outside of Tokyo. I moved my family back to Santa Ana, California, and we bought a house in my old neighborhood. Some of my children went to my old grammar school.

I spent a year over there in Japan. We were there when the Tonkin Bay [Vietnam] crisis hit, when the—what were they called? Patrol boats, I guess, they got into a big fracas with our Navy. But since we were about ready to go home, they kept us in Japan. We transitioned and went back home, and the new squadron that came and picked up our airplanes was immediately sent to—I believe it was Cubi Point in the Philippines, and that was the beginning of the U.S. involvement in Vietnam.

Came back to Santa Ana. I was assigned to the Marine Corps Air Facility at Santa Ana, California, and because of my background as an interceptor pilot and with aeronautical engineering behind me, I was assigned to an outfit that was automating the flight intercept system. That is, we had the kind of airplanes or were getting the kind of airplanes that can be, when launched, the radar guy on the ground, when he finds an enemy, the pilot would put his airplane on autopilot and they would establish a datalink between the radar people and the guy in the airplane. Actually, the radar on the ground was the thing that flew the airplane. It was called the Tactical Air Data System.

My job was to design the fighter intercept trajectories that we would fly in order to intercept various kinds of targets, and then we would put those into the computers and then we would go practice flying them and see if they worked okay. We would keep modifying and tweaking that sort of thing.

It was there that the Marine Corps came out with an announcement that NASA was getting ready to select a new group of astronauts, and suggested that anybody in the Marine Corps who was interested in making application should send their application to the Commandant of the Marine Corps. So I decided that I would give it a try, and I was mainly interested in just seeing how far I could get. An old friend of mine, an old Marine fighter pilot friend of mine, was an astronaut at that time, it was C.C. Williams, and I figured, "Well, C.C. made it, maybe I can. I'll just see how far I can go in the process."

So in 1965, I made application. Didn't hear much of anything for quite some time until it seemed to me it was late 1965, when I was notified that I had been selected as a conditional candidate, and would I like to go ahead further with the process. Of course I said, "Yes, that will be just fine."

So I was sent to Brooks Medical Center there in San Antonio [Texas], where we did our physicals, and our physical was very much like the one that they show in the movie *The Right Stuff*, just about all the same stuff. We didn't have any of the comedians like Pete [Charles C.] Conrad [Jr.] in the movie, but there was lots of good memories about that. It's an unforgettable experience, I'll tell you.

Came back from that. I found out that I have mild flat feet and I had hay fever, so I figured, "Well, I'm not a perfect specimen, so I probably won't be selected for this thing." So I sat back and went back to my work and didn't think much about it anymore until I got another

call. This time they said, "We would like to have you come to Houston. We're going to put you in the old Rice Hotel and we're going to have oral interviews to try to select someone for the group."

So I went to Houston and met again some of the guys that I had met at the medical screening. We went through a process of sitting in front of a long green table, and guys sitting at the table were Deke [Donald K.] Slayton and Warren [J.] North and Al [Alan B.] Shepard [Jr.] and several other engineers. I think there was a psychiatrist and a doctor there. And just were thoroughly grilled. In hindsight, I could see that they were just trying to find out, get a good handle on how we would react, how we could handle ourselves under pressure, but they really worked us over.

RUSNAK: What kind of things would they ask you?

CARR: Oh, across the board, from what types of airplane I had flown and what I'd done in the airplanes, and what my hobbies were, they grilled me, asked me questions about my military flights and my military experience, asked a lot of family questions, as I remember. So when I finished that, I said, "Whoa. That was really pretty tough." And there were fifty of us in that group. There were 350 of us that were medically screened. It started from a group, I think, of 8,000 candidates.

So I went home. This was after the first of the year, 1966. Went back home and said, "Well, gee, I got further than I thought I would."

So one day—in fact, it was April Fool Day in 1966—I was up in Van Nuys, California, at a meeting with Litton Industries. These were the people who were designing the Tactical

Data System that we were flying with the radar people. I was conducting a meeting in a big conference room with about—oh, golly, there must have been fifteen or twenty engineers and people sitting around, and we were busy talking about the system, when the secretary came in and she said, "Major Carr, there's a Captain Shepard on the phone who would like to talk with you, and he says it's very urgent."

I said, "Well, what in the heck is Bill Shephard wanting?" Because we had a young captain at my control squadron named Bill Shephard. It's not the Bill Shephard, incidentally, who's associated with the International Space Station. So I said, "Well, he says it's important, so I guess I'd better talk with him."

I picked up the phone and I said, "Hello." I said, "This is Major Carr."

He said, "Jerry, this is Al Shepard down at the Manned Space Center in Houston, Texas."

And I said, "Oh. Yes!"

And he said, "If you're still interested, we would like to have you come down here and join the astronaut group and work with us." He said, "Now, one thing I must tell you is that you must keep this very quiet, because we haven't made the press release yet. You can tell your wife, but please don't tell anybody else."

And here I was sitting at a table with about fifteen or twenty engineers. So I said, "Well, yeah, I'll do that," and I thanked him and I tried to be noncommittal while I was talking with him so that these people wouldn't get a hint. But they said afterwards, after it became common knowledge of what I'd been selected for, they said they could tell something was definitely afoot, because they said it looked like I had risen up out of my chair about a foot and was just kind of floating there.

Well, anyway, that was the notification and that was April Fool's Day of 1966. I came home. Incidentally, they wanted me to report within thirty days. So I came back home and my wife was fixing dinner. I came in the back door and I said, "Guess what? They just called me and I've been selected to be an astronaut."

And she looked at me and said, "April Fool." [Laughter]

As it turned out, things really got wild then. When the press release was made, we had newspaper people all over the house. I had six children at that time, and at least four of them were hams, so we had a lot of fun with my kids hamming around. They came, and the newspaper people later on came to watch us pack the house and pack the van, just covered everything that was going on.

That was quite some time later, though, I should say, because within the first thirty days there was no way to move the family. I had to drive to Houston myself. In those days I had a 1953 MG-TD, so when I packed up the MG with all of my clothing and things that I was going to need at NASA, and left the family in Houston, the plan was I would go over, report, get settled in, find us a house, and then we would move the family.

Well, I made it as far as Yuma, Arizona, the first night. It was very hot. So the plan was that I would go across the desert at night and spend the days sleeping at Yuma and other motels and things like that. Well, I woke up the next morning. Let's see. When was that? I arrived about two o'clock in the morning. I woke up at about eight or nine in the morning and I was very flushed. I went in and I looked at myself in the mirror, and I was just covered with spots and I was flushed. So I went to the flight dispensary at the Yuma station there. I think in those days it was Naval Air Station Yuma; it wasn't a Marine station yet. The flight surgeon looked at me and started laughing. He said, "You've got the three-day measles."

I said, "What am I going to do? I'm supposed to report to NASA and here I've got the measles." [Laughter]

Well, he said, "Well, it won't hurt you to go ahead and drive on out there. By the time you get there, it'll be about gone." But he said, "You should drive at night when it's cool. Don't overheat yourself or anything like that," which was the plan anyway.

So I started out that evening, out of Yuma, and went across. I don't know where I stayed, but I remember the first motel I went into, about two or so in the morning, the person behind the desk took one look at me and his eyes got large. I knew I was probably scaring him half to death.

The second night I was in West Texas, and again this was in May, and you know that's the rainy season. West Texas is very prone to flash floods, and I had been told to watch out for flash floods, and it was raining. I started out, and was probably about thirty miles west of Fort Stockton, I was following another car and the rain was really coming down, and all of a sudden that car in front of me disappeared. I started to put my foot on the brake, and about that time I saw brown water hit the side of my car and go up over the hood of the MG, but the distributor and everything is on the left side of the engine, so all of the water went over it, just missed the distributor and everything. So all I could do was downshift my MG and just keep on going.

About halfway across this thing I caught out of the corner of my eye the other car was right in the middle of it, dead in the water, and I had been washed to the left side of it so that I got by him without hitting him. But I was up to my waist in water, sitting in that MG, and it was cold. I was going [gasps]. And got around the other car and got up on the other side, checked on the people to see if they were okay, and they were fine. They'd gotten out. The water had already started coming down.

So I went on into Fort Stockton and went into a gas station, just opened the doors of my car and let all the water out, hosed everything down, and got back in the car and kept on going, and arrived the night before and stayed at the BOQ [Bachelor Officer's Quarters] at Ellington [Air Force Base, Houston, Texas]. That was the night before we were formally announced on May the first. But it was quite an experience coming across the country.

RUSNAK: It sounds like you had an interesting journey not only getting that trip, but the whole way to NASA in your career.

CARR: Yes.

RUSNAK: By the time you had joined NASA, they were about midway through the Gemini Program, so there had been space flights. They had done Mercury and a few Gemini flights. What had you thought years earlier when they had selected the first astronauts and these Mercury guys had become somewhat celebrities?

CARR: Icons. Yes. Well, I was very, very proud of them and I was very excited about the whole thing, but never identified myself with that program at all. As far as I felt at the time, I was a fighter pilot, a Marine fighter pilot, and had no visions of having done that or wanting to do that. It wasn't until that announcement came out from the Marine Corps when I was a junior major, that I decided it would be a thing to try for, and I really only did it to see how far I could go. It wasn't one of my driving ambitions to be an astronaut, because I just didn't think that that's what I was going to be. I figured, well, I was going to be a Marine fighter pilot.

RUSNAK: Did you pay a lot of attention to, say, the Mercury Program or these other early events in the space race?

CARR: Yes, I did. I paid a lot of attention to it. I followed all of the missions very, very avidly and very carefully and was really interested in what was going on, but I never identified myself with that program.

I might say that when we first reported to NASA, it was a rather tumultuous time because that was about the time that [Charles A.] Bassett [II] and [Elliot M.] See [Jr.] had their accident in St. Louis [Missouri] and were killed. It wasn't long after we arrived that Gemini VIII flew and Neil [A.] Armstrong had the thruster stuck on and got into the spin-up mode. I think maybe it made a few of our guys say, "Gee, I wonder what we've gotten ourselves into here."

RUSNAK: If we can stop and change out our tape here.

CARR: Okay.

RUSNAK: What did you expect from the job of an astronaut when you first joined NASA?

CARR: Well, the lunar program, you know, the moon program, Apollo, had already been announced, and we were all very hopeful that we had in our future an opportunity to fly to the Moon. That's one of the things that we were told very early in the ball game, "If you expect to

fly to the Moon, forget it. Those seats are all taken. By the time you get through your training phase and get on to where you would be ready for it, you will have not had the chance. So your missions will be post Apollo," which turned out not to be true. We ended up with quite a few of our guys that were selected for the lunar program.

As we began our what we called astronaut basic training—and it seems to me in those days it took about eighteen months—we began studying—we studied a little bit about Gemini systems, but for the most part we studied all the Apollo systems. The thinking there was that we were going to become support crew members. We would be third-stringers and we would be the guys who tracked the vehicles through the manufacturers as they were being built and did all that sort of specialty support work.

The original seven astronauts were still there at NASA when we arrived, so we got a chance to get to know all of them. John [H.] Glenn [Jr.] and I became good friends because we were both Marines and we also attended the same church. He was an elder at that church, and when he left to pursue other things, I took his place as Elder of the Webster Presbyterian Church.

The kind of work that I got selected for, once we finished all of the training, was the lunar module. I became part of a group of guys who were responsible for following the lunar module [LM] through its development and fabrication and delivery, testing and delivery to the Cape. The other guys who I worked with were Ed [Edgar D.] Mitchell and Fred [W.] Haise and John [S.] Bull and Jim Irwin. I think that's about it. Some of the guys were assigned to the booster, guys like Jack [R.] Lousma and Stu [Stuart A.] Roosa. Some of the guys were assigned to the command and service module [CSM]. So that's kind of the way we were spread out.

About that time we decided to give ourselves a name, too. There was an Original Seven, so we called ourselves the Original Nineteen. Somewhere along the line there, I can't remember the dates, we lost Ed [Edward G.] Givens [Jr.] to an automobile accident, so we were down to eighteen. Then I think it was [F. Curtis] Curt Michel decided to resign. So our numbers started coming down a little bit.

As soon as the Gemini Program was over, we immediately rolled right into the Apollo Program, and that's when my work with the lunar module got very hot and heavy. I spent a lot of time at Grumman [Aircraft Engineering Corp.] Bethpage in New York while they were building the lunar modules, and we actually had sleeping quarters in the building right next door to where the vehicles were being built. We were on call day or night to go in there to work with the people.

As they built the lunar module, we would do the testing of the systems as they were put in, so you can think of it as kind of a layered cake. They put the first layer in and we tested all those systems. Then they put the second layer in and we tested those systems and then them with the ones below. As they built up the entire lunar module, we did a lot of the testing work. We were the subjects. We were the people who did the switch throwing and that sort of thing during the process.

The same thing was going on in Downey [California] as they [North American Aviation] were building the command and service modules. Meanwhile, the guys working the booster spent a lot of time at the Marshall Space Flight Center [MSFC, Huntsville, Alabama] working with the booster people.

Those were really great years. They were the real heady years of NASA. My first assignment outside of following the lunar module was as a support crew member on Apollo 8.

In those days, Apollo 8's mission was changing very regularly. Frank Borman had been the chairman of the investigating group of the fire, the Apollo [1] fire.

Flashing back to that now, I can remember the day that happened. We were in Los Angeles. We'd been doing some sort of a tour or familiarization thing with Downey [afterthought – I think maybe we were returning from a field trip], and we were at Los Angeles Airport getting ready to fly back—as I remember, we were flying commercial—when the word came out that there had been a fire and that astronauts had been killed at the Cape. We had no other information. A bunch of us were just kind of wandering around, "How can we find out what happened?"

I said, "I'm just going to go call the *Los Angeles Times* and ask them." So I did. I picked up the phone and called the *L.A. Times* and told them who I was, and I said, "We've just learned about this. We don't have any information. What can you tell us so that we'll have some knowledge as we go back home?" And so they gave me the information and I passed it on to the rest of the guys.

But that was a pretty terrible time. I think it really demoralized all of us. NASA was beginning to feel very confident. It had completed the Gemini Program and had done a beautiful job, and things were just swimming along great in the Apollo Program, and this disaster hit. We had to dig our way out of that. Frank Borman, his leadership, along with the management [team] that worked with him, were responsible for getting us out of that and getting us psychologically prepared to get on and get the rest of the job done.

At any rate, Frank was assigned Apollo 8. But the problem was, it was clear that Apollo 8 was not going to have a lunar module ready in time. The lunar module schedule just would not support Apollo 8. So they decided, well, Apollo 8 should probably be a precursor like 9 and

10 were going to be. That is, just go around the Earth and test out the systems and that sort of thing.

Well, I think Frank had a lot to do with the decision that we really ought to be more audacious about this thing and we really ought to head to the Moon. So the Apollo 8 mission was finally finalized as that mission to the Moon that would be there Christmas Eve. That was really something.

I was a lunar module man, but we had no lunar module, so my job became the flight data file coordinator for the mission, so I worked with the other guys that were working the Apollo 8 mission, getting all the flight data file together. I worked a lot with Bill [William A.] Anders on getting this done.

Then we began doing all of our sims [simulations], and that's when I began to meet some of the really great guys that are in mission control supporting the program. I got to really get to know people like Cliff [Clifford E.] Charlesworth and Gene [Eugene F.] Kranz and Milt Windler and—oh, gosh, I could just go on and on. One of my favorite guys was Gordon [M.] Ferguson. Gordon Ferguson was sim sup [simulation supervisor], and he was always the villain. Whenever we had a sim, Gordon was the guy who threw in the problems, and sometimes they were formidable problems. But he really worked over both mission control and the crew in the spacecraft because of these integrated mission sims we were doing.

My memories of Apollo 8 are particularly fond because I remember Susan Borman and how concerned she was. Frank was very concerned about Susan, and so, you know, it was just the anxiety sort of thing. They had sort of a code work between them, and that was when things got kind of iffy and everything, she would say or he would say, "The roast is in the oven at 350," or something like that. It's in the transcripts.

And so I remember on Christmas Eve after the launch and they were headed on their way, they'd done translunar injection and were on their way to the Moon, Susan asked me if I would say that to him, so I said it. He said, "What?" Then he said, "Oh." Took him a minute. It was totally out of context for him and he didn't know what to do with it, but he got the picture.

I really was thrilled to be part of Apollo 8. It was really a monumental mission, very gratifying to be part of it.

My next assignment after Apollo 8 was Apollo 12, and so we moved right on. Then the lunar module that I had worked on in Bethpage was the lunar module assigned to Apollo 12, so this time as a support crewman I had a piece of machinery that I was responsible for working with, and that made it even more gratifying to work Apollo 12. Working with Pete Conrad and Dick [Richard F.] Gordon [Jr.] and Al [Alan L.] Bean was just a joy. There was always light-heartedness, there was always a lot of fun along with the hard work that was going on while we were working there.

I was the capsule communicator for launch, and the pre-launch, all the phase went just beautifully and we got to the weather and the weather people started sweating thunderstorms. I can't remember, I don't think we held for anything. I'd have to go back and review the data. But there were thunderstorms in the area and people were worried about them. But the decision was made to go ahead and go, because they were far enough away that they didn't think that there would be any problem with it. So we launched.

Just about the time we had tower cleared, everything, all the lights went on, and the people in mission control could see that all of the navigation systems, the guidance, everything in the command module was just rolling over on its back and putting its feet up in the air. One thing I remember the guys down in the booster console were saying, "The booster's okay. The

booster's okay. It's guiding properly. We're all right." I don't remember who the mission director was, but he heard that, so he said, "All right. Let's sort this thing out."

And the [flight] dynamics officer and the flight—FIDO, I guess he was, anyway, we were all working the system, and all of a sudden the guys came up on the radio and they said, "We've lost everything. We've got the master alarm light on. The inertial guidance system has rolled over on its back. What's going on?"

And about that time one of the guys on the console told the flight director to have me tell them to put the SCE switch to AUX [Auxiliary]. So I said, "Apollo 12, this is Houston. SCE to AUX. Put your SCE to AUX."

And there was this silence, and they said, "What was that again?"

And I said, "SCE, signal conditioning electronics, to AUX."

"Where is it?" [Laughter]

So I told them the panel number and they finally got it turned on, and that helped get things back together again.

As you know, the IU [Instrument Unit] on the booster took the system up, put it into orbit, and everything was just fine, and they had time then to begin sorting things out, re-erecting their gyros, and we sent them a new state vector update and everything got back in good shape again.

Then we began to try to find out what in the world happened. Well, they looked at some of the video of the launch, and they saw that it had been struck by lightning, that essentially lightning had gone in at the escape tower, gone all the way down the vehicle, and as long as the exhaust gases from the rocket, from the booster, were still impinging on the launch tower, that electricity went right down through those gases and were expended out, grounded out on the

launch tower. So once they got far enough up, then everything was okay, and they'd just been zapped, that's all.

So the big question now was, was anything damaged. So we went through a lot of diagnostics and checked out a lot of things to make sure that the vehicle was okay.

One of the funniest things was the download tapes. You know every few minutes the guys on the ground download the tapes, the conversations that are going on in the spacecraft. Well, they downloaded the tapes of the crew during the incident. It was so funny, because Alan Bean was saying—no, Pete said, "What the hell is going on?" And one of the other guys says, "I don't know." And Alan Bean says, "We've got power on the bus. We've got power on the bus," which means our electrical system is okay. And Pete's saying, "What the hell's going on? I got this wrong and I got that wrong," and he started calling off all the things. I could just imagine the confusion and the mayhem that was going on in the command module.

Then I heard my voice come in and say, "SCE to AUX." And I heard them questioning back and forth, "What in the world is he talking about?" Because it's a very remotely located switch and it was something that I don't think anybody ever fiddled with in training. So it was not up front in their minds and they couldn't find it. But once we got it done, got things taken care of, the mission went on beautifully. But that tape is one of the funniest tapes I've ever heard in my life, because Pete, besides saying, "What the hell's going on?" he started giggling after a while, as only Pete can laugh. So there's a guy, even under stress, had a sense of humor.

Well, that was pretty much it. Apollo 12 went from then on according to Hoyle, was a very successful mission. I did a lot of work with training the crew on going to the other vehicle that was on the lunar surface, and I can't remember the name of that communications vehicle, but they landed not far from it.

RUSNAK: Surveyor.

CARR: Surveyor. That's right. Surveyor III or Surveyor VIII? Can't remember.

RUSNAK: Three, I think.

CARR: Three, I think. Anyway, their job was to go over to Surveyor with a pair of bolt cutters and bring back some pieces of it, and I worked that segment of the lunar surface portion with them and thoroughly enjoyed working that part of the program.

After Apollo 12, if I remember correctly, I was assigned to work with the lunar rover. We fiddled with the hand-cart idea for a few missions, but NASA decided to build a lunar rover, and I've always admired that as a real monument to good engineering, because in one year's time we went from concept to flight configuration. It was the Boeing Company and Bendix and Delco-Remy, and we did all of our testing of the lunar rover vehicle in California, at Goleta. So I really enjoyed working that. I got to know a lot of good Boeing people and did a lot of work at the Marshall Space Flight Center.

Then when we got it fabricated, it was put together, I think assembled at Goleta at the Delco-Remy plant, and we did our testing at Pismo Beach, California, because the dunes at Pismo are a lot like what they thought the lunar surface was going to be like. Jack Lousma was the other astronaut assigned to that, so the two of us worked that rather heavily and had a really fine time working that program.

I'll never forget one time that we were testing on the sand dunes at Pismo Beach, and in those days dune buggies were a big thing, and Pismo Beach was a big dune buggy haven. Well, we had the lunar rover, the prototype lunar rover, out there, and we were practicing ingress and egress; that is, getting in and getting out of it while you're fully suited. Jack was fully suited up in his suit and he was working, grunting, and snorting and working his way in and out of the lunar rover when we heard this roar on the other side of the dune. Here came this dune buggy over the top of the dune, with this long pole with a little red flag on the end of it, and this guy came over the dune and all four of his wheels left the ground and he landed on our side of the dune. He apparently had applied the brakes while he was airborne, because when he hit, he just stuck. You could see his eyes get as big as saucers. He put it in reverse and he backed over the dune and never came back. [Laughter] But those are great Apollo 12 and lunar rover memories.

RUSNAK: How do you go about designing a vehicle to drive on the Moon when you haven't had that much experience with the surface or with really the kind of environment that this is going to be driving in? How do you approach these problems?

CARR: They had some parameters. They knew that this lunar surface was heavy in dust and that it was thick, so they were going to have to have a wheel that wouldn't throw dust all over the place, and they also had to have a wheel or a tire that would roll over the sand or the dirt and not sink into it. So we ended up with hollow tires. They were made out of a stainless steel mesh. They actually put little chevron treads on the tire made out of aluminum. They knew they wanted maneuverability, so they designed this vehicle with front wheels that could turn and

back wheels that could also turn, or you had the selectability that you could turn off the back wheels and they would stay straight and it would go like a regular car, but if you wanted both sets of wheels to turn, you could throw the switch and it would turn in its own footprint. So it was a very, very maneuverable thing.

The other thing was that we had to have a vehicle that was compatible with the gloved hand, because the astronaut has very little mobility. So we had to have the kind of seat arrangement where the astronaut could see and be fairly comfortable. He had to be able to control it all with one hand. And that hand controller eventually became the standard for hand controllers that are used on wheelchairs, on mobile wheelchairs today. But the hand controller was very much like the hand controller in the command module, except that you could pull it back like a lever and you would get reverse, or push it forward and get the forward. But then we had the turning. The yaw was for turning. It worked very well.

But basically we had to look at the sand and we had to look at the maneuverability we want, and we also were very, very concerned about navigation, because one of the concerns was that if the lunar rover got behind a dune or behind some kind of a hill and the crew needed to find their way back, you might have a problem. You need to have backup systems so if one system failed, if a battery failed, you could make it back.

Basically, the nav system, it turns out, you could just follow your tracks. But the idea was that you could have been on some kind of a circuitous traverse and then at that point want to go right straight back to the LM, and you certainly don't want to follow your tracks back to the LM.

But after the lunar rover vehicle assignment, my next assignment was, I think, selection as backup crew, or on the crew for Apollo 19. So they put us, as I remember, as backup crew to

Apollo 15. Our crew was to be—Fred Haise was going to be the CDR [commander], Bill [William R.] Pogue was to be the command module pilot, and I was to be the lunar module pilot. We got started on that, began our training program, and, oh, if my memory serves me correctly, it was around 1970, early 1970 or so, when it was decided that Apollos 18, 19, and 20 would be canceled. So that was a bad day at Black Rock for the three of us. We had lost our opportunity to go to the Moon. I remember we moped around for quite a few weeks.

Then Tom [Thomas P.] Stafford called me into his office and informed me that I was to be the commander of the third Skylab mission and said, "Do you think you can work with Bill Pogue and Ed Gibson?" And I said, "Of course I can." [Laughter]

At that time, then, they took us off our roles as the backup crew for Apollo 15 and put another crew in there, and we began focusing ourselves on the Skylab mission.

RUSNAK: With all that was going on in Apollo, had you paid much attention to Skylab as it was developing?

CARR: Very little. I paid very little attention to it. Bill Pogue had had an assignment, a short one like I did with the lunar rover. I think he worked Apollo Applications for a little while, so he was a little more familiar than I. But most of us had been totally focused on the Apollo Program.

RUSNAK: What did you think, then, of Skylab when you got this assignment? Just happy to get a seat?

CARR: I was delighted to get a seat, and I was absolutely floored that they would select me to be a commander, because there hadn't been a rookie commander at NASA since—what was it? I guess it was probably Armstrong on Gemini VIII.

RUSNAK: That's right.

CARR: And so I was really flabbergasted to be selected and very happy to do it. What delighted me the most, I think, was the fact that I was going to be working with Al Bean and Pete Conrad and people like that again, so it was really a wonderful thing.

We didn't have a chance in the beginning to get much training, because the two crews ahead of us were going to get it all, but we had to wait till the Apollo Program was over. So even Pete Conrad and his crew were only getting catch-as-catch-can training whenever the simulator was available. So we were playing with cardboard and things like that to try to figure out what to do.

One of our main tasks was to help put together the training program that the Skylab astronauts were going to be using, and we worked very hot and heavy with people in the training department, helping them brainstorm and get that sort of stuff out of the way. Since we didn't have any simulators to work with and we couldn't do anything else, it was probably an excellent use of our time.

That program, the Skylab Program, was really quite a training opportunity, I guess you could call it, a challenge. We were going to have to learn two systems. We had to learn the command and service module system. We also had to learn the Skylab system, the workshop systems. And on top of that, we had experimental systems that had to be learned. So three

years from announcement to flight was certainly not an inadequate amount of time; it was an adequate amount of time to do all of this kind of work.

One of the interesting things about the Skylab Program that developed later on was that this was the first opportunity for people who were not capcoms to speak to the crew. It was on our mission that Dr. [Robert M.] MacQueen was allowed to talk to Ed Gibson directly about an experiment. It was the first time that I know of that anybody on the ground other than capcom was allowed to speak to anybody on orbit. Of course, that's changed significantly over the years since then.

But the jobs that we ended up individually with, naturally Ed Gibson was the guy in charge of experiments, and particularly the solar physics experiments. Ed had written a book recently, called *The Quiet Sun*, and was somewhat of a solar physics expert, among us, anyway. So he really focused pretty much on that particular experiment, the ATM experiments. Bill Pogue got a lot of the Skylab fluid systems and a lot of the other experiments. My main task was the Skylab navigational guidance and nav and all of that. We focused on those. We structured ourselves so that all of us could operate anything, but if anything went wrong, there was one expert.

That's a good place to stop.

RUSNAK: Okay.

RUSNAK: If we can talk a little bit more about some of the specific training you went through to learn the experiments and systems that you had to know to be up on Skylab.

CARR: Well, the training is kind of two-phase or three-phase. The first thing you have to do is you've got to read the theory of the experiment, so we had to get some level of understanding as well as we could, considering we weren't astrophysicists or astronomers or something like that. We had to learn about what the experiment was all about and why it was being done in order to be a competent performer, if you want to call it, or executor of the experiment.

In many of the collateral experiments that we did, the experiment hardware wasn't there, and in many cases we worked with, again, cardboard and things until the principal investigator finally got his piece of experiment there. Many times we found human factors problems with the experiment. We found that a lot of the PIs [principle investigators] knew nothing about human factors and they knew nothing about being weightless, so they would prescribe things to be done that just weren't practical at all in a weightless environment. So we worked very diligently with those fellows, trying to get their experiments in a configuration that could be easily accomplished, and I think they appreciated our willingness to do that. For us it was important, because we wanted success.

The three main tasks, of course, of Skylab were to study the human body, to study the sun, and study the Earth. So we spent a lot of time on those experiments. The medical people really wanted us to thoroughly understand what we were doing, and they actually could use the experiments in the final months. They could use the experiments on the ground as the way of gathering the baseline for the physiological data that we took on orbit. So again we studied the theory, we started looking at the equipment, we advised the people designing the experiment as to how to make it more compatible with a weightless environment, and then we accomplished the experiment.

The medical stuff, that was pretty straightforward. We just learned how to use the experiment and we actually took baseline data on ourselves, which became part of our medical records.

The solar physics work was extremely difficult, because the Apollo Telescope Mount [ATM] control panel controlled a great number of different experiments. The Apollo Telescope Mount itself, the telescope, there were five or seven experiments in that big mount, and I always thought of it being like a big Gatling gun or a gun turret, because it turned. What you did is you would turn the drum inside there and you'd position one of the experiments to take solar data, and then when you finished with that, you would position another one and take data.

All of the various experiments were the proprietary interest of a whole bunch of different principal investigators, so one thing that Joe [Joseph P.] Kerwin and Ed Gibson and Owen [K.] Garriott had to contend with was the competition between the principal investigators to make sure that their experiments were done with a reasonable amount of priority and that they were done properly.

So those guys developed a handbook. It was called *Joint Operating Procedures*, and that turned out to be the bible. It was almost like signing up to a truce or a pact. We had to get all of the experimenters to sign up to that and agree that this JOP, this Joint Operating Procedure, would be the one everybody would go by. And if somebody's experiment failed or something went wrong and it didn't get done, there would be no screaming and yelling, that an effort would be made by the planners to re-program it later on down the line, but that they would go with this program.

It was a real breakthrough, because until then, there was a lot of infighting going on. Particularly Owen Garriott and Ed Gibson were getting a lot of flak from experimenters wanting

to make sure that we understood they had invested a lot of their money, probably most of their budget on this thing, and they didn't want it screwed up. There were a few experimenters out there who had absolutely no confidence that we could do anything, and they probably considered us to be not much more competent than a bunch of chimpanzees up there trying to do these very important experiments that they wanted to have done.

I'll jump forward and say at the end of the mission those guys came forward and thanked us and said they had misjudged us and that they were very, very happy with the work that we had done for them.

Now jumping back to training again. We did a lot of those experiments that way. The other one, the ATM was, I guess, the most complicated of the bunch because of all of the things that were involved in it. It was also tightly involved with our navigation system and the pointing system. The spacecraft had to be in exactly the right attitude, and then the drum had to be pointed also just a little bit more—even more accurately, to within something like a—seems to me it was a tenth of a degree of accuracy, which is incredible accuracy.

The third experiment was a study of the Earth, the Earth Resources Experiment Package. That again was a tough one, because we had people from all over the world who wanted data taken and certain sites down on the Earth, and we had to have photography. They had to rig up a simulator that would allow us to practice tracking these targets and taking the data that these people wanted. But it worked out very well and we were able to get all of that good data that we wanted.

One of the things that Ed and Bill and I decided early, probably halfway through our training program, was that we really wanted to have extra film, we wanted to get briefings from people around the world who were experts in different kinds of Earth phenomena, because, as

we said in those days, we did not want to be in the position at a debriefing of having someone ask us about something and being able to say nothing more than, "Yeah, we saw it. Sure was pretty."

So that was the beginning of the Earth Observations Program. We went to Ken [Kenneth S.] Kleinknecht and said that we really wanted to be intelligent observers of the Earth when we weren't doing other things, and could he help us with it. Well, they gave us forty hours of training time and they said, "What we'll do is we will find at least twenty world experts on various phenomena on the Earth, and we'll have them come, and they get two hours of your time to brief you on what's important about what they want to know and how to look for it."

That turned out to be probably the most exciting and the most rewarding of all of the experiments that we did, was the opportunity to ad lib, and to ad lib intelligently. The kinds of people we had were a guy named Silvers, who is an earthquake-fault expert from Southern California; a fellow named Campbell, who is an expert on ice formation in the northern and southern latitudes; there was a desert formation expert; meteorologists; a fellow named—oh, boy, he's going to kill me because I can't remember his name—from La Jolla. But these people were programmed in and they very happily came and sat down with us and talked about what it was, what it would take to get them data that would teach them more about their particular studies of the Earth.

So we enjoyed those forty hours of training. They gave us a lot of extra film, a lot of which was ruined when the Skylab had its problem and part of the insulation was torn away. But we were able to get by with what we had.

The Earth Observations Program has been carried on now, and I understand it's still going strong in the Shuttle. We kind of feel like we were somewhat the fathers of that. I think

Al Bean and his crew got to do some of that, too, because we got it started. They were able to get in on it, too, and spend some extra time taking photographs of ad lib things on the ground.

The other training we got at the last minute was regarding the comet Kohoutek. It was discovered at the Hamburg Observatory early in that year, that this comet was headed toward the sun and it looked like it was going to do perihelion about Christmas Day of '73. There was a lot of talk about maybe that's—the period of the comet was 2,000 years, so there was a lot of talk that maybe that's what the Star of Bethlehem was, was actually that comet, because of the biblical stories of this new star. At any rate, we did some studying of that and tried to do some preparation for that experiment as well.

We also had student experiments that we had a lot of fun with. Skylab was the beginning of the time when student experiments were brought aboard. The other crews and we had a very good time working some of those student experiments.

So as you can see, we had a very busy life learning all of the different kinds of science, so we were essentially dabbling in a lot of science. We also had all of our regular command module and training that went along with that. I think that's a very exciting one. The command module training they give you for when you land in a Stable 2 position, that is, with the point of the command module pointing down instead of up, and it's a stable position and periodically a spacecraft is likely to do that. So over there in one of the buildings they had a big old pool, and it's not the neutral buoyancy system over there, either the old or the new. This was one way in the back by the astronaut gym.

They had this command module in there, and what they do is they put you in it and then you're all strapped in and you're in a mode and the dress that you're in when you're coming back from the mission. Then they take a crane and they flip it over, nose down. The idea is that you

have to get out of it. It's like a milk bottle. You turn a milk bottle upside down and it'll float, but it fills up part way with water. So basically what they did is, we went to Stable 2, and then the next thing we do is throw the switches on the bags that are supposed to flip us back over on our back. Oh, it failed.

So now the question is how are we going to get out of this spacecraft while it's upside down and we're in our pressure suits. So what we had to do is put on neck dams, which are a rubber thing that goes around the ring and fits tightly around the neck so your suit won't fill up with water, and wrist dams. Then when we're all ready to go and we've got all our suits all sealed up so we won't sink, then the next thing to do was to release the pressure in the command module and remove the hatch.

Then you have to sit and wait quietly while the water fills up in the command module, and the three of you have to sit there and wait till the water stops. They told us just about where the water would quit. Well, then the next thing to do is then one at a time you go out, go down in the water and swim out through the hatch and up through the side of the spacecraft, and then inflate your vest. It was a pretty routine thing; it wasn't too terribly difficult. Any of us who had been through Navy flight training had done that at Pensacola in what we call the Dilbert Dunker, where you train for planes that land, crash upside down.

Well, we were sitting in there. We'd done all of the things we needed to do and the water was filling up. Incidentally, all of our families were sitting in the galleries watching this little exercise. NASA had said, "The families can come and watch this one if you want to." Well, the water came up and hit the point where it was supposed to stop, kept on coming. When it got another three or four inches above that, I said, "Guys, I think we'd better step up the pace a little bit, because something is wrong."

So we stepped up the pace and got out of the spacecraft and got our vests inflated and got into our little rubber raft, and by that time the spacecraft was extremely low in the water. It turns out that a valve had either failed or been left open, an air valve on the other side of the spacecraft. So that the air that was supposed to be trapped in there and holding us was leaking out, so the water was leaking up on us. I'm not sure whether our wives and kids knew what was going on, but we got out. But that was probably the most exciting piece of training that we had the whole time. They used to do that out in a lake or out in the ocean, but by Skylab they had brought it and put it in the tank.

RUSNAK: I'm sure it's safer that way, with more controlled conditions.

CARR: Yes. But I understand that divers were going in the water and people were getting pretty excited when our spacecraft didn't stop sinking.

RUSNAK: I imagine so. At least you guys had enough sense to get out of there before it filled up too much.

CARR: Yes.

RUSNAK: I assume that you guys were still in the training mode when they launched the orbital workshop by itself.

CARR: Yes. We were in our final training mode. That is, we were mostly focusing on the command and service module training and things like that. But when the orbital workshop launched, we left the launch area and said, "Oh, boy, that was really beautiful." It just went off beautifully. By the time we got back to the Holiday Inn, the word was beginning to come out that there was something wrong. We learned about that, and again we had another bad day at Black Rock, because that looked like that might be the end of the program.

John and Annie Glenn were with us at the time, and John said, "Now, hang on, Jerry. Don't worry. They'll think of something." And history has it that they were able to do some wonderful things. It's again another monument to the flexibility and the versatility of the human being, and that is that we were able to figure out how to deal with that problem and correct it and stabilize the vehicle and get it back, thermally stabilize the vehicle and get it back in operable condition.

RUSNAK: Did you have any role in that recovery process or in training?

CARR: No. The support crews for Skylab did most of the work in those. The other two prime crews and Pete's crew, we kind of stayed out of the way. We lent support. I think we went down to watch every once in a while as to what was going on, but if my memory serves me correctly, we didn't get involved too much in finding the solution, because that was kind of a thing where we were just in the way.

Now, Pete's crew, once they began to focus on how they were going to solve the problem, Pete's crew got very deeply involved in it, and the electric company, they got those big

electric company tools that were needed for cutting off branches and things like that, that Pete and his crew had to work with.

RUSNAK: Once they had the vehicle stabilized, it was clear that they were going to be able to send their crew up and other crews. How much did you pay attention to the activities of the previous crews and the activities going on up there on the Skylab?

CARR: We watched everything they did. We were very, very interested in what they were doing and we followed them very closely. We followed a lot of the activities on the ground. When the temperature didn't stabilize low enough and they wanted it to get lower, we were very interested observers in design of the new umbrella that was put out by Al Bean's crew and how that was going to work.

RUSNAK: Did you learn anything from their flights that you could then apply to your training and think about for your mission?

CARR: Yes. We drew a lot of conclusions from what we saw there. I think the most important conclusion that we drew was that when the first crew came back after twenty-eight days, they were pretty wobbly, pretty weak. So the second and third crews decided to bump the exercise periods up, and we doubled the exercise from half an hour to an hour. Al Bean's crew went up, and their exercise period was for an hour a day. Turns out that that didn't appear to be enough either, so we increased it again to an hour and a half for my crew.

We watched the way experiments were being done, and some procedures were modified based on what the first two crews had learned. One of the things that we noticed on the second crew is that they were really hustling all the time. The rate of work, the rate of activity for them was extremely high. We began telling some of the managers that we didn't think that that rate of work was going to be wise, that over a ninety- or an eighty-four-day period of time we weren't sure we were going to be able to sustain that. We thought that the work load should be leveled off some and there should be more rest.

Everybody agreed to that, and the experiments that were on the schedule were slowed down and spread out quite a bit, but unfortunately they added a whole bunch of new experiments, and we allowed ourselves to get trapped into a situation where with all the new experiments that were added at the last minute and all the new problems that would be associated with those that weren't taken into consideration, so when we got up there, the first thing we found out is we were again overcommitted just like the first crew was and that we were going to have to sustain it for eighty-four days instead of the fifty-nine that they were able to do it on.

RUSNAK: Let's get into your mission, then.

CARR: Okay.

RUSNAK: Going up to launch, they discovered some problems with the booster. Tell me about those.

CARR: Well, I think it was the day before we were to get in our T-38s and fly to the Cape, they found cracks in the fins of the booster and they notified us to hold, that there were cracks and they were going to have to evaluate that situation and see what to do with it. We had already gone into confinement, into the pre-mission confinement. So it was just a matter of waiting to see what happened. Finally they allowed that it was going to take probably a week or so to change the fins, that they had to be changed.

So we just had to settle back and we continued our command module training and just kept our skills warmed up and went back to training and waited the extra time. The disappointment for me was that we were to have launched on November the tenth, which is the Marine Corps birthday, and I was very excited about that. The Commandant of the Marine Corps was to be at the launch, along with some of his staff. So when it was canceled and slid to the sixteenth, we missed that little opportunity that was kind of a nice opportunity, but we missed it.

That was about it. The delay didn't bother us all that much, but it was just kind of an irksome thing.

RUSNAK: Describe the launch experience for us, the time leading up to it and actually going up the hill and then in orbit.

CARR: Okay. Went to bed early that night, knowing full well I wouldn't sleep worth a hoot, but we had started several days earlier trying to shift our Circadian clock to allow us to go to bed at something like six in the evening and expect to wake up at two or three in the morning. So at about two o'clock in the morning, Elmer [L.] Taylor, who was our coordinator, our flight crew

systems coordinator, came into my room and said, "Well, your bird's waiting. It's time to go." I had actually fallen asleep, finally, so I was awake with a start, got up.

We went down and had our—the first thing is the physical. One part of the physical was microbiology scrubs. They took swabs and they swabbed many parts of our bodies to find out what kind of flora and fauna were living on us, and they catalogued that. It was part of an experiment, a long-term experiment. They wanted to know how much of it we would leave on the spacecraft. They wanted to know if we would pick up anything from crews ahead of us and that sort of thing. So that was done.

After the physical, then we went into the crew dining room and had breakfast with Deke and Al and Kenny Kleinknecht and people like that. It's interesting that our meals at the crew quarters were always steaks and eggs and all those good things that are just wonderful for cholesterol. In the subsequent years, my wife and I have totally modified our diet now to where we don't touch either one of those, mainly because of the cholesterol and fat content of the food. But it's amazing that dieticians in those days thought that was the best thing in the world for us, was lots of steak and eggs and things like that.

After the meal was suit-up time. We went in the suit room and began suiting up. On my ankle I carried a watch. I put a watch on my ankle. I was not supposed to be taking anything extra up, but I had this Movado, which was a self-winding watch, one of those with a little counterweight in it, and I was very curious to find out if the self-winding watch would still work in weightless environment or whether that weightless environment would inhibit the motion of that little counterweight and keep it from being wound up. Our Omegas were regular hand-wind, plain old mechanical watches. So I put that on my ankle and then we suited up.

After the suit period was done and the pre-breathing was all done and it was time to launch, we got up and picked up our little canisters that generated the oxygen that fed the suit and walked down the hall toward the van. Of course, all of the staff, all of the people that had been supporting us over the years were all standing in the hall. I think that was probably one of the more moving experiences to me, to see all those wonderful people there to see us off. We managed to hug a few of them and tell them "thank you" through the helmet, since we were all sealed in.

We got aboard the van, and Charlie [Charles A.] Buckley was the security man. He was the guy who was there with us, along with our suit techs. Incidentally, Charlie Buckley would be an interesting guy to interview if you can. That's a little side thing.

We rode the van up the hill and decided this was the slowest any of us had ever ridden on that particular highway, since we all tended to drive a little fast. And we rode up the hill. One of the things that we had done before was, of course, the tower escape training, and that was an exciting ride down that gondola, down the cable to the side of the vehicle and into a half-track which would take us away from the scene of any kind of a catastrophe.

We stopped at the launch platform and we were all struck by the desertedness of it. There was just nobody there. Every other time we'd been at the tower, there were people everywhere working on things. This morning there was just nobody there except us and the van. We said goodbye to Charlie and headed for the elevator with our suit techs. Went up the elevators and went across the swing arm to the vehicle.

In the white room of the vehicle was the crew, the white room crew, and they had been the white room crew since probably early Gemini or maybe even Mercury, I'm not sure. But

one of the traditions that we had was that the fellow who was in charge of the white room crew was a German, and age has gotten to me and I've forgotten his name.

RUSNAK: Guenter [F.] Wendt.

CARR: Guenter Wendt. Guenter Wendt. That's right. Guenter Wendt's favorite candy was sourballs, and it had become somewhat of a tradition for the crew to present Guenter with a bag of sourballs when you get into the white room. So when we got out of the elevator and got into the white room, one of the techs handed me my bag of sourballs and I handed them to Guenter.

Then we loaded up inside the spacecraft. As I remember, Hank [Henry W.] Hartsfield [Jr.] was the guy who was in the spacecraft at the foot, helping us get settled in and everything, and then his job was to go underneath the couches and squeeze out and go out the hatch before they closed the hatch door.

So they closed the hatch on us.

RUSNAK: If we could stop there and change out the tape.

CARR: Okay. [Tape Change] Okay. Well, after Hank exited the spacecraft, then they closed the hatch and it was just the three of us in there, and we began the preparations that we had done so many, many times on the simulator. But I remember we looked up, we leaned forward a little bit and looked over at each other and just giggled like a bunch of schoolgirls, because we had been waiting for this opportunity for eight years and at last it was really going to happen. I think I remember saying something like, "I can't believe it's really going to happen."

But that was it before launch. From then on, most of the launch was just doing the things we were supposed to be doing, and we were very, very busy.

Launch went off perfectly. It was a beautiful, clear day. I remember when the escape tower was finally kicked off and it took the shroud with it, the light that came in the cabin was just blinding for a minute. It was incredible. I tell a lot of people that riding on a booster like that is kind of like riding on a train with square wheels. You've got lots of noise, lots of vibration, and all that sort of thing. Then sure enough, when you hit that first booster shutdown and staging and then the next booster kicking off, it's just exactly what everybody has called it: a train wreck. I just thought that was very apt.

We got into orbit without any problems at all. Everything worked just fine, and eleven minutes and twenty-eight seconds later we were on orbit and things were beginning to quiet down.

Looking out the window for the first time, I was totally disoriented. I didn't recognize a thing. Suddenly somewhere in the first hour or so of the mission, I saw Italy and I said to myself, "Italy really is shaped like a boot." And it was a wonderful experience. I've never forgotten that particular experience.

Then we went on with our preparations for rendezvous. Got out of our suits, got ourselves situated in our couches, and began doing all of the things we needed to do for the rendezvous. The rendezvous went very, very well. The docking didn't go too well. The procedure was, when we were within about—I can't remember what the distance was, but we were to have a closure rate of about a half a foot per second, and I let it drift to about a quarter [or] less foot per second. So essentially we just came in and kissed it. Well, what happened

was, we didn't kiss it hard enough, and the capture latches, we bounced out and then the capture latches…closed. Then we just kind of drifted back out.

We thought we had contact, and I reported contact, and then I noticed that the line of sight reticle that I had was drifting. About that time Bill said, "Uh-oh." And then I said, "Uh-oh. I don't think we captured."

So we reported it to the people on the ground and they said, "Well, you'd better back out and hold your position while we try to figure out what to do next."

We had to go through a special procedure to recock the capture latches on our probe so that they would be withdrawn and be ready to work again. I don't remember how long it took, but it seemed like hours, but I'm sure it only took a few minutes to go through that procedure and get that recocking done.

The second time I went in, I must have hit it at three-quarters of a foot per second, or a foot, because I belted it good and we captured and locked up and rigidized very well. But it was an interesting feeling, because when I hit it, apparently the Skylab module moved away from us a little bit and the capture latches grabbed it and pulled it back, so it rebounded and came back and hit us back. It was sort of a rebound sort of a situation, which I didn't expect and I'd never experienced it or even thought about it in training. But the old bird hit us back.

Then we went through all of our procedures, but the plan was not to enter the workshop at night. We were to go to bed and take it easy. So we worked fairly late and then we decided to have dinner. About that time, Bill was saying, "I'm not really feeling too terribly well." So we talked about it and we said, "Well, best thing to do, probably, is to eat. Maybe that'll make you feel better." So we went ahead and ate our dinner. One of Bill's items was stewed tomatoes, and he ate them and he waited for a while and he said, "It's coming back up." So he

got his bag and he barfed into his bag. So then we started talking about what we were going to do about it.

The day before we left JSC, the doctors had come in and said, "Now, we're real concerned about this space-sickness thing. We want you to take medications." In the medical sensitivity tests they'd done on us, they found which of the anti-nausea kinds of medications were best for us, didn't have the most side effects and all that sort of thing. So the doctors said, "Jerry, we want you to take something and we want all three of you to take something."

I said, "Wait a minute. I'm driving this million-dollar vehicle, and I'm not even allowed to drive an automobile or fly an airplane when I take Scopdex. Why do you want me to do it now?"

They said, "We don't want you to get sick."

I said, "I'll take the sickness rather than the disorientation or the side effects." So I decided not to take it.

Well, Bill wanted to be a good patient and he said, "Okay. I'm not driving or anything, and I'll be able to manage fine, so I'll take the Scopdex." And what surprised us was Bill's the one that got sick. And the other thing that surprised us is that Bill had been a [U.S. Air Force] Thunderbird, an acrobatic pilot. Whenever Bill and I went up in a T-38 to do acrobatics, I was usually the one that got green, not Bill. So it was very puzzling that Bill was having a problem here.

But that's kind of the way it happened. We discussed this sickness thing, and Ed and I said, "Well, look. Maybe the best thing we ought to do, with all this pressure they're putting on about the sickness, we just won't say anything." In fact, one of us suggested that we even toss the vomit down the trash airlock and not even report it. That way we won't get people all fuzzed

up down on the ground. So we said, "Okay. That's what we'll do." And we said, "We hope Bill will feel better tomorrow and we won't have to confess."

Well, unfortunately, Bill, being the sick one, was also the guy in charge of the communication system, and Bill had left the switch on that was recording all the intercom conversation. So while we slept that night, people on the ground played it back and heard all of this. So the next morning, Al Shepard came up on the capcom loop and said, "Jerry—" I forget what he said, something like, "You guys have made a mistake here, and I hope you haven't destroyed the vomitus bag."

I said, "No, we haven't done anything like that." I said, "I agree with you. It was a dumb decision. We'll just go from here. We'll report it in our medical report, we'll weigh it, we'll do all the things we're supposed to do and we'll just go on from there."

So they caught us red-handed, trying to cover up information, which we felt pretty bad about. But that was our motive: we didn't want to fuzz things up anymore. So we did it. It was a dumb decision. I wish I hadn't done it, but we did it.

The next morning, Bill wasn't feeling great, but he was feeling better. Ed and I were both feeling okay. I had a feeling in my stomach that was kind of like a big knot, but I wasn't sick. Ed just didn't have any problems at all. We always thought that was kind of a marvel, that Ed, the one who had the least flying time, was the non-sick one, and the rest of us, based on the amount of flying time, that was our measure of sickness.

Anyway, Bill and I decided to change jobs, because my job was a little more sedentary than Bill's was to be, so we swapped checklists and went on. That helped. Bill was able to stay quiet and got my work done, and I got his work done and it worked out. For the next couple of days, when Bill got to feeling a little funny we would swap jobs, but for the most part Bill was

able to pick it up within twenty-four hours and carry his load without any trouble at all. But he didn't feel good.

The other thing that we noticed was the head stuffiness. We'd been warned, but we just didn't recognize that it was really going to happen. When it came on, we began to realize that this is something that's really a bother. You feel like you're standing on your head. All of your fluids are up in your head. Your eyes are kind of puffy and you have this feeling of congestion. That was the only uncomfortable part of being weightless. The rest of it was just a blast.

We went through the hatch into the workshop, and we found that we had some visitors waiting for us. It seems that Al Bean's crew had taken some of our spare clothing and stuffed them and made dummies out of them. One was on the bicycle. I believe that was Bill. And the one with Ed's name on it was latched down in front of the ATM control panel, and mine was out in the large part of the workshop at one of the storage lockers. So that was kind of funny.

We went ahead and did all of our preparation. It seems to me it took three or four days to just get things moved in and set up before we even really began doing our experiments. It was a lot of setup time, a lot of preparation time. But we got all of that done and then began doing our experiments.

That's when the schedule caught up with us. We found that we had allowed ourselves to be scheduled on the daily schedule, and the schedule was so dense that if you missed something or if you made a mistake and had to go back and do it again, or if you were slow doing something, you'd end up racing the clock and making mistakes, screwing up an experiment or not doing a procedure correctly.

That went on for many, many days, and it was hard on our morale to be rushed like that and not be able to get things done and get them completed and get the experiments done. We

knew, we were sure the experimenters on the ground were grinding their teeth when we would have to report, "Well, I didn't get this experiment done because in my rush, I put the wrong filter in," or I did this or I did that. We found that it was almost to the point where you almost had to schedule a time when you could go to the bathroom, it was that tightly scheduled.

At night we would have dinner and we would go right back to the experiments, and we'd work till probably nine o'clock at night. Then it would be time to wind down and go to bed. So at ten o'clock when we were supposed to be in bed, none of us were ready to go to sleep yet because we still had things to pick up and put away and do things. Our minds were still moving too fast to rest. So we just weren't getting the right kind of rest. We weren't getting the right kind of leisure time that would allow us to do the right kind of job.

So finally somewhere—well, I should also say that we began to get a little bit testy, too. In order to make up some of the experiments, some of our fluffs, they were having to redouble and even tighten the schedule even more. They were juggling exercise around, and we ended up in several cases where we were having exercise right after a meal, and that's no time to be exercising, particularly up there, when you can't belch, because with food floating, you're liable to get it back with your belch. So we started grousing at them about that, and they were working hard trying to keep up with the schedule, and we were giving them a hard time and they were giving us a hard time.

So finally, at a point in the mission, I guess it was the third, maybe the fourth day off we were to have. We kind of set up a ten-day week, and the tenth day of each week was to be a day off, and we could do what we wanted on the day off. That was to be our shower day, too, when we could take a shower in the little makeshift shower that we had.

Well, we gave back our day off the first three or so times, two or three times. We said, "Go ahead and schedule us, and we'll try to do some makeup." Well, we got to the point where the morale was low. We weren't feeling too good. We were getting tired. So we said, "Let's take our day off and maybe a good day's rest will get us back in good shape again and we can begin to maintain the pace."

So we took our day off and did what we wanted to do. We all took a shower. Bill and I did some reading and some looking out the window, doing Earth observations, photographs and things. Ed played at the ATM panel and did some little rough experiments and did some observations ad lib. We had a good day. One of the things we did is we got careless with our radios and we forgot to configure for one of our passes, so when we went AOS [acquisition of signal] over one of the sites, people on the ground called us and we didn't answer them. So the press just thought that was wonderful. They said, "Look at that. These testy old crabby astronauts up there won't even answer the radio now. They've turned off their radio and they won't listen to the people on the ground." So we have lived under that stigma all these years, but basically it was we just got careless and we were busy doing other things and didn't think to configure our radios. For some reason they couldn't get through to us and we missed a pass, and I think it caused a certain level of concern down there.

But anyway, day after that, right back onto the treadmill again, working, working, working, doing all the things we had to do, and things didn't get any better. So somewhere on the order of the fiftieth day, after dinner we have a medical conference where we talk with the flight surgeon. We tell him physically how we're doing, we gave them the readings of the food that we'd eaten and the water we had drunk and all that stuff that they needed for their metabolic analysis. At that time I said, "You know, I think we need to have a seance here." I told him

about our situation, that we weren't feeling good about things, we weren't getting our work done, we weren't too terribly happy, and we were quite sure the people on the ground weren't happy with us either. I said, "I think it's time for us to have a discussion, a frank discussion." I said, "We can do it on this channel if we want."

That went down to the doctors. The doctors passed the word. The press got a hold of it and raised Cain. So the people came back, mission control came back and said, "We're going to have to do it on the open circuit." I said, "That's fine."

So that evening or whenever the evening was that we did it, we started talking with them as we came up over Goldstone [California], I think it was, on the West Coast. We had the whole U.S. pass and out over a mile or two, essentially for me to tell them all the things that were bothering us. I told them everything. I said, "We need more time to rest. We need a schedule that's not quite so packed. We don't want exercise after a meal anymore. We need to get the pace of things under control." Then we said, "Okay, now, next pass over the U.S., you guys please tell us what your problems are."

So we went over the next time, and they bent our ear with all of the things we were doing, making it difficult for them to have the flexibility to schedule when they needed to because of our rigidity and things like that.

So we said, "Let's come to a solution here. Let's try and think about it overnight and then maybe we can come up with a solution in the morning."

Well, we slept on it. The next morning they sent a teletype message up to us and they recommended quite a few things. The most important thing was to take all of the menial, routine housekeeping chores out of the schedule and put them on what we called a shopping list. It was something that needed to be done that day but they didn't care when you did it, as long as

you did it that day. That opened up the schedule, took all the pressure off. We were no longer racing the clock to get things done. That really solved the problem.

The other thing they said was that "We're not going to hassle you anymore during meals, and we're not going to give you any major assignments after dinner. After dinner is relaxation time for you. Do a few things like some student experiments, but we're not going to have any major experiments after dinner."

We said, "That sounds great. Let's go with that." And it worked beautifully. It's a testimony to the human condition, really, that you think—Henry Ford probably learned it on his assembly line. The assembly line can only go so fast before you start making mistakes.

We also felt that the extra time was needed to be creative and do some creative thinking, and as a result of having all that extra time, we were all able to gin up little experiments that we had wanted to do and put them on TV, and a lot of those are being used today in schools, little physics experiments with water and things like that. That really solved the problem. The loosening of the schedule allowed them to get their more important experiments done, and the rest of the stuff got done when we could, instead of on a real tight schedule. It worked out beautifully.

Bill Pogue and I recommended very, very strongly to the International Space Station Program that that's the way they [should] program their days, and I think they took it to heart. I hope that they're working that way. They're going to end up with the same problems we had on International Space Station if they try to put the crew to the wall and make them get all the things done.

Part of the motivation was, "My gosh, it's costing $20,000 an hour for you guys to be up there. We've got to get things done." And we agreed with it, but when we got in the middle of

it, we realized that that was a fallacious basis to try to do our work. So we learned a lot in terms of just human condition, human frailties, and how to do things.

As it turns out, when the mission was over, we completed every one of the experiments that we needed to do. We got them all done, plus a lot of extra ones that we dreamed up. Ed was—he and Bill were the two guys who dreamed up more experiments than you could shake a stick at. I think one of the funniest pieces of footage I've ever seen is the experiments that Bill did that he wanted to demonstrate the fact that air is a fluid, a medium, just like water, but when you're in air, you know, you can't kick and paddle and swim and get somewhere. Nothing happens. So what he did is he made some big cardboard fins for his hands and his feet. He put on a crash helmet with big bubble eyes on it, and he looked like some kind of bug. And he was out in the middle of the thing, flapping his wings and actually moving around, and proving that—the physics proof was that air is a medium like water, you've just got to have the right kind of surfaces.

RUSNAK: Let's talk about a couple of the specifics from your mission. If you could tell me a little bit about the EVAs [extravehicular activities] you guys did.

CARR: The EVAs. They were spectacular. The first EVA Bill and Ed went out on, and we had a lot of repair work to do on that one. We had some microwave devices on the side of the spacecraft that faced the Earth, and unfortunately there are no handrails on that side of the spacecraft. So we trained for it in the water and we tried to figure out how we were going to do it, and basically what happened was, we found a place on a truss where we could fasten foot restraints. Bill got into the foot restraints, and then Ed got on Bill's lap and stood up, and Bill

held Ed while Ed reached up and did the work that he had to do on a microwave antenna. That was the way we had to ad lib that particular EVA.

We also did all of our routine work that meant going into a lot of the cameras in the ATM and removing film packages and putting new film packages in. But that was the first EVA.

The second EVA I went on. In fact, I went on the last three EVAs, and I'm trying to remember which one was next. I guess the second one was the Christmas Day EVA, and that was Bill Pogue and me, as I remember. That was a seven-hour EVA. I believe that broke a record, a world record for length of time on an EVA. I was amazed when I got back in. I figured I'd have to go to the bathroom something fierce, but I didn't. I decided that what happened was that I got rid of those wastes, fluids, through my pores. The system somehow compensated and I sweated it out, because I was really sweaty, but I really didn't have to urinate, and I was just amazed at that, after seven hours, that I wouldn't be pretty interested in getting to the urinal.

We finished that EVA and then that evening we were supposed to do a TV thing, where we were to do a presentation for the people on the ground. The three of us observed what it was like to be up there and what we saw on the ground and how we felt about it. We had built a Christmas tree. We had taken a bunch of food can liners from our kitchen and fashioned them into what looked like a little aluminum cedar tree. Then we had taken all kinds of decals and things, orange and red and green decals, and stuck them on the tree for decorations, and then we made a foil star with a trailer on it to put on the top, which was the comet Kohoutek. That was our tree.

So after dinner, we did what we called our Christmas program, and then the people on the ground said, "There are some Christmas presents for you up there." They told us where to go look, and, of course, we went scampering over to look. One of the things they had for us was a beta cloth Christmas tree, but we already had one. My family sent to me a little gold icthus, you know, the little Christian fish symbol that you see on automobile bumpers and a lot of people wear them on their lapels. That was my Christmas present.

My Christmas statement, I had a lot of help from my minister. I had written that before I left and brought it up with me, and my minister helped me write that Christmas statement. I, frankly, don't remember exactly what I said. But I think the one thing Ed said and the one thing that impressed us the most was that Ed pointed out—and he was the first astronaut I know of to point it out—that you can see no boundaries on the Earth, no man-made boundaries, that the barriers that man puts up between himself and his fellow man, that the only boundaries you can see are the natural ones, the rivers, the lakes, things like that. So his message was that there's a universality of human beings up there. We're all in the same boat together and we really ought to learn to live peacefully together.

RUSNAK: That's a very nice message, particularly for Christmas. Did you guys have images of what Apollo 8 had done on Christmas when you were preparing your messages and the meaning that had for a lot of people?

CARR: You know, I don't remember whether I folded Apollo 8 into that or not. I just don't remember.

RUSNAK: One of the things you mentioned for the missions of your Skylab flight was to do these comet observations. That's what these second and third EVAs were for, too. Tell me about looking at the comet and what you guys thought about that.

CARR: Well, the comet was a disappointment in terms of brilliance. Everybody, and even on the ground, thought that it was going to be a beautiful, brilliant comet, and it turned out to be very faint. We really had to work to find it. And once we found it, it was a gorgeous little thing, but it was really small and faint. We took as many pictures as we could of it, but I don't think our film was sensitive enough to really get good pictures. I think the only decent one that was taken was with a coronagraph on the ATM. I think the people on the ground got better pictures of the comet than we did.

So in order to describe what we saw, we did drawings. Ed Gibson was the point man on that. He did the drawings and then he would do a TV report, showing the drawing to the TV and describing the colors that he saw. There's a little beak on the front end of the comet that he talked about and the significance of that. That was it. It was a disappointment, but it was really fun looking for the comet and finding it. We set experiments up outside to try to capture it while we were inside, and we brought them in on subsequent EVAs as well.

RUSNAK: If we can stop to swap the tape.

CARR: Okay.

RUSNAK: You mentioned that the comet was a little bit of a disappointment from what you had expected. How did the other types of experiments you were doing, the medical and the Earth observations, compare to your expectations in terms of their performance?

CARR: Most of the experiments went just as we had expected them to go, except those new ones they added in at the last minute where we had to kind of fumble our way through the procedures and work them out. That's the neat thing about the simulation systems we have at JSC. There just really shouldn't be any surprises, and there weren't really many. Most of the experiments worked well. We had a few that failed. We did a little repair work here and there and got some of them to come back and gather some data. We had one or two experiments that failed and just never got a bit of data, which is a disappointment. But we had fifty-three experiments, and to only lose one or two out of fifty-three, I thought was pretty good.

Most all of the experiments were just about what we expected them to be. The physiological experiments were really interesting to us, to watch how our bodies accommodated to the weightless environment. We were really interested in that.

RUSNAK: What would you say were the greatest contributions or achievements of your Skylab flight?

CARR: I think probably the most important contribution of the Skylab flight was the medical stuff. We proved, I think, just absolutely positively that the human being can live in weightless environment for an extended period of time, and it's, of course, subsequently been proved that you can stay up at least a year or a year and a half. But medically, we gathered the data that I

think gave the Russians and other people the understanding and the courage to say, "Okay, we can stay up for longer periods of time." And I think that was a real breakthrough, because if you remember back in the Mercury days, the doctors weren't even sure if an astronaut could swallow or defecate or urinate on orbit. We have come a long, long way. Our experiments were very rigorous experiments. They were very well done, and data was very well taken. I think that that solved a lot of problems.

The next question is, if you're going to go to a place like Mars, can you go there weightless? If so, are countermeasures that we've developed, are they going to be adequate for that? Because the problem is, you can stay up there for a year, but when you get there, you've got to be able to do something. Then you've got to turn around and fly back, and that's another year. So that's what Space Station is really good for, I think. We're going to find answers to those kinds of questions.

But I think the medical experiments were probably the most important. I'm not a solar physicist, but I have a strong feeling that the solar physics community gathered a wealth of data that answered a lot of unanswered questions in the world of solar physics, and I think Ed Gibson will probably have a lot of really good things to say, very cogent things to say about that program.

Earth Resources was very, very helpful. The Earth Observations Program created a lot of great data that a lot of experimenters have been using and working with for years. I think it was a good program, too, but I would rank it maybe number three, a close number three. But I would lump Earth Observations in with Earth Resources. The two programs really went beautifully together.

RUSNAK: After coming back to Earth, what kinds of things were you doing in NASA before you left the space program?

CARR: Well, when I came back, that was the end of the Skylab Program, so we began shifting gears into the Shuttle. As I remember, the Shuttle RFP [request for proposals] was beginning to come out or maybe was already out, but they were beginning to move definitely into the Shuttle Program. Then the Apollo-Soyuz Program was getting going, and they were getting started with their training and all of that was going on.

During those first two years, I kind of moved toward the Shuttle Program and Shuttle cockpit design and that sort of thing. I ended up working with the Shuttle seats, the ejection seats for the early model, going out to White Sands and seeing tests done and working that part of the program for quite a few years—not quite a few, just a couple, I guess.

I think the major thing that I got involved with was the Shuttle cockpit design, trying to put human factors to work. As a result of Skylab, I became a convert to human factors. Before that, in the early years up until probably 1970, 1971 or '72, people looked at human factors engineers as kind of weirdos, you know, these guys that always want to touch and feel things, and they thought it was kind of silly to be measuring the distance from your wrist to your elbow and how it reached things and that sort of thing. But in Skylab, we began to realize the importance of the relativity of the human to the piece of machinery you're working with and what the weightless environment does to your skeleton and affects the way you do your work. So that precipitated my interest in working the Shuttle cockpit and doing it rather extensively. That was really my swan song.

One other side job that I got during that period was when the Shuttle simulator was to be built, I was named chairman of the Acquisition Board, SEB [Source Evaluation Board], I believe they call it. That was a monumental job, trying to get the requests for proposal put out and then get it modified and then get the proposals in and select the person, the people who were to build the 40-million-dollar simulator that we use today. That was administratively scary, because you had to be so careful to make sure that the decisions that were made were unbiased, that they were not shaded by any of your own biases or anything like that. You had to be very, very careful that everybody was treated fairly and equally. So we had administrators and we had lawyers breathing down our necks, procurement specialists.

RUSNAK: Why did you finally decide to retire from NASA?

CARR: Mainly I left NASA because it looked like we were looking at six to eight more years before the next flight, so I just didn't want to wait that long for another flight. I was also very interested in the idea of beginning to ply my trade as an engineer in the commercial world, as a professional engineer.

So when I left NASA, I joined a company in Houston, Bovay Engineers, and I did some business development work for them for a few years, and then I became the director of the Houston Operations office. I learned a lot about the business of engineering from the other side of the proposal. Having done the SEB work in the simulator and had to deal with people who wanted the work and having to deal with them, now I got to be on the other end of the stick and be one of the people who wanted the work. It was very interesting. And then learning to

manage an engineering department to get a quality product out on time was really an interesting challenge for me, too.

At that same time I did a little bit of moonlighting with the Air Force in Los Angeles. I did some consulting there on human factors engineering with those kinds of folks, but it was a small amount of time kind of an effort, but it was something that at least kind of kept my hand in the business a little bit.

But as it turned out, after about four and a half years, with Bovay Engineers and a little company I was working with in Los Angeles, called Applied Research Incorporated, I got homesick for aerospace again. So Pat [wife Patricia L. Musick] and I decided to set up a company. We started a little company called Camus Incorporated, C-A-M-U-S, and we got the name from our names, "C-A" for Carr and "M-U-S" for Musick. But when we put it all together and saw that it said Camus, we said, "Gee, that's a French existentialist philosopher and we're kind of a philosophical kind of a company, and it's also the name of a good Napoleon brandy, so this has got to be a good name." So that's how Camus Incorporated got started.

Camus Incorporated had two lines of business. Number one was my wife's art. She was a painter and then became a sculptor. One facet of our business was art production, art marketing, and that sort of thing. The other part of the business was my aerospace consulting that I wanted to get back into.

It was about that time that Bill Pogue and I linked up again and said, "You know, we really need to try to get in on this new Space Station Program, because we've got so much knowledge in our heads, we really ought to offer it to somebody and we really ought to try to do something." But we decided we didn't want to become employees of an aerospace company; we wanted to be independent. We wanted to be something like consultants. So we began by

approaching the various large aerospace companies with Camus Incorporated and saying that "We want to offer Bill Pogue and Jerry Carr and other astronauts and engineers who may become available to help you with the conception and the design of the Space Station." We talked with Lockheed, Rockwell, Boeing, Vought, quite a few different companies.

Boeing, I think, was really the only company that took us seriously. Most of the other companies were willing to use us for business development and to be spokespersons, but they didn't really see us as being "in the trench" kinds of people who want to work with engineers. But Boeing did. Boeing wanted to get back in the aerospace business again, because they had left it, and they decided they were going to compete in the Space Station Program. So in the Phase B effort, they hired Camus Incorporated as a subcontractor to help them with their proposal, and they won a Phase B proposal, so then they decided to go for a Phase C/D, and they kept us on.

What it boils down to is, I have been working Space Station for fourteen years with Boeing as their subcontractor. We started out with just Bill and me. We've added quite a few different people, other astronauts, Byron [K.] Lichtenberg, Jack [R.] Lousma, Harrison [H. "Jack"] Schmitt. I'm leaving somebody out. We also got a lot of engineers, former NASA engineers, who worked with us. Milt [Milton L.] Windler worked with us, Gordon Ferguson, Glen [H.] Cress [III], Ed [Edward L.] Pavelka, Nellie [N.] Carr.

But essentially we went into the very guts of the Boeing Company that was doing the Space Station work, and we essentially tried to train their engineers. We tried to teach them about weightlessness and what the effects of weightlessness are on the body, how it affects your ability to address the piece of machinery you're trying to work. We talked to them about the importance of scheduling and how to make your machinery user-friendly so that you don't end

up getting people wrapped around the axle when something goes wrong. I think a lot of that probably paid off. So we've seen the space program go from Space Station to Space Station Freedom, to International Space Station, to what it is today, and we've been through the whole thing.

I finally retired completely from aerospace work about two years ago, and my new job description now is studio assistant. I'm enjoying welding and woodworking and running heavy equipment while I assist my wife in the design of her sculptures. I do a lot of the engineering design for it, to help her make sure that we have good solid bases and that they stand up straight the way she wants them to and the way she envisions them.

RUSNAK: It sounds like it's just as interesting work for you to do.

CARR: Oh yes.

RUSNAK: Before we got on tape, you and I were talking a little bit about some of the people who were mentors for you and who were important through your career. If you could tell us about some of those people.

CARR: Well, I guess my first real mentor was my scout master as a boy, who essentially taught me independence and self-confidence and how to take care of myself.

The next was that Marine…lieutenant colonel that was at the naval ROTC program. He was a person who taught me, I think, integrity and the need to be dedicated and work hard and accomplish what it is you intend to accomplish, set goals and then accomplish them.

In the fighter squadron I was in, I had a Marine fighter squadron skipper, his name was Dale Ward. He commanded VMF-122, which was the *Crusader* squadron I was in. He's the guy who taught me leadership. He taught me that if you're going to have good leadership, you need a leader and you need people who want to be led. Then the leader has to very clearly tell the people that he's leading, what he wants from them, and how he wants them to do it, and then he's got to leave them alone.

Then in NASA there were a couple of guys who really were very influential. The most influential person to me was Wernher von Braun. He and I struck up a friendship and were friends for quite a few years. He was a man that embodied the leadership and the dedication and the integrity that I think that's important for a person to have. I remember one day he and I, after my mission, were walking after the Shuttle mockup that's in Building 9A had been built. He and I walked and he grabbed my arm and we were walking in the European arm-in-arm kind of configuration that European men walk in, and we were walking down the center of the payload bay, and he stopped in the middle of it and he looked in both directions and he looked it over, and he said, "You know, this is a wonderful machine. I've dreamed of a machine like this for years." But he said, "If I had the choice of any mission that I would have liked to have flown, it would have been your mission." He said, "That was because of the things that we learned about humans as space inhabitants." He said, "If I'd had any mission I could fly, I would have flown that one."

The other guy who I consider to be my mentor at NASA was Pete Conrad. Here was a guy who knew how to lead, he had integrity, he knew how to set a goal and get it done, and he knew how to make people enjoy it while they were doing it. He was a free spirit. I was never as free as Pete Conrad was. He imbued in people the willingness to just get anything done, and we

would do anything to avoid disappointing Pete. So those are my really great mentors in the space program.

Post space program, my most important mentor is my wife. [Carr becomes emotional.]

RUSNAK: I want to take this opportunity to give you a chance to make any last comments you would like to get on tape before we close for the afternoon.

CARR: Okay. As soon as I get my marbles gathered up again.

RUSNAK: Would you like to take a break for a minute?

CARR: Yes, let's take a break till I— [Tape recorder turned off.]

The thing with my wife, Pat Musick, is that when I met her, I was a technocrat, an engineer, a technician, an astronaut, a pilot, and after having met her and getting to know some of her friends, a door was open and there's a whole new aspect of my life that was open to me that I hadn't any appreciation for, and I learned to appreciate and love art. At the same time I took some of my expertise in planning to help her. I helped organize her career so that we had records. You know, artists don't keep very good records. So I did a lot of that work for her in the beginnings and helped her kind of get organized, taught her about backup systems. She wasn't accustomed to working with more than just one plan, and if that plan went down the tubes, then she went down the tubes with it. She wasn't too tolerant of her mistakes.

So after we had been together for quite some time, she began to get the picture that it's good to have backups and it's good to have ideas what you're going to do if this doesn't work,

and then she began to realize, "Shoot, I kind of do that all the time anyway, I just didn't realize it." Because when she's doing a painting or a piece of art, if something doesn't come out just right, there's always a shift you can make and a mode you can do, a backup system that will allow you to go ahead and complete it and still be happy with it. But that's where I helped her.

Where she helped me was in teaching me to appreciate art, and through the art the two of us have influenced a lot of people, a lot of young people. We spend a lot of time with kids. We're enjoying our life together. So for me it's been wonderful to be able to have art to step into when I decided it was time to quit doing the aerospace work.

RUSNAK: It seems like you certainly have a wonderful life going for you. I'd like to thank you for taking these few hours to sit down and talk with us a little bit about that life.

CARR: You're welcome. It's been my pleasure, too. It's been a real wonderful experience just to reminisce through all that.

RUSNAK: Great. I'm glad you enjoyed it.

CARR: Thank you.

[End of interview]