

**Mr. Robert Crippen**

**Oral History**

**Kennedy Space Center**

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1 Roger Launius: Ok. Well, I'm Roger Launius. We are down at Cocoa Beach and we're  
2 interviewing Robert Crippen, sir could I ask you just to give us your full name, your birth date, kind of  
3 where we can find you for the record?  
4

5 Robert Crippen I'm Robert Laurel Crippen, also known as Bob Crippen, better known as Crip.  
6 Currently I'm living in Florida in the Palm Beach Gardens area.  
7

8 Launius: OK. All right. Can you tell us a little bit more about your background. Where were  
9 you born? What was your home life early on? Who were your parents? What'd they do? Those  
10 sorts of kind of background things.  
11

12 Crippen: Ok. We let's see. We could probably spend two hours talking about that.  
13

14 Launius: Ok.  
15

16 Crippen: I was born in Beaumont, Texas. My dad is Herbert Crippen and my mom is Ruth.  
17 Ruth, Andress was her maiden name. Dad was working in the oil fields. Which, he'd been doing  
18 that for quite some time which was a very transient, kind of life, so they were traveling through  
19 Beaumont when I was born in Hotel Deu which was the hospital there. Spent about six months and  
20 then we lived in Louisiana, California, traveling around. And when I was about five years old my dad  
21 had an accident on the rig and lost a couple of fingers and with the insurance money he bought a  
22 little place in Porter, Texas. He bought a chicken ranch there. Porter at that time was really a little  
23 country town. It's now a suburb of Houston. Had one sister who was born about three years after

1 me. We grew up in Porter. My dad ran the chicken ranch for a while, then ended up building a  
2 service station and a little beer joint, which took them through the rest of their life. I went to school  
3 in a small town called New Caney, Texas. It was a very small school. [I] started the first grade and  
4 graduated the twelfth grade there. And small, I think there were a total of a hundred people in high  
5 school. My class was probably about twenty people that graduated there. So it was kind of a low  
6 beginning as far as educational aspects were concerned. I was, I think my dad instilled in me that I  
7 was going to college very early on. He had only gone through the third grade and education was  
8 something that he wanted to make sure that I had [the] opportunity to go. I didn't even think about  
9 not going to school. I attended the University of Houston for a year, then a little school called Sam  
10 Houston in Huntsville, Texas, with my intent all along I was planning on going to the University of  
11 Texas. I was mainly worried about the money but I'd saved up enough and such that I could do  
12 those last years of my schooling and got a degree there in aerospace engineering. My folks could  
13 support the education a little bit, but I worked in the summers primarily, various jobs, but I did  
14 machine shop stuff, I did work on the railroad which was one of the more fun jobs that I had where I  
15 was a switchman running along the tops of cars and hooking cars and that kind of thing. That plus  
16 serving meals at a boarding house allowed me to get through school. While at school I met my first  
17 wife, Virginia Hill. She and I were married during our last year in school. And upon graduation I  
18 joined the United States Navy. So, that's a little bit of. . .

19

20 Launius: Ok.

21

22 Crippen: . . . of Crip growing up.

23

1 Launius: Ok, well great. How did you hit upon aerospace engineering as your major? Had  
2 you always been interested in flying?

3

4 Crippen: I grew up interested in flying. You know, building model airplanes and that sort of  
5 thing when I was very young. So, wanting to fly, I think was something that. . . I can't even  
6 remember when I started. . . my dad didn't fly. I had an uncle that flew. My dad went up with him  
7 once and decided that wasn't for him so he didn't fly. And I had never been in an airplane at all. In  
8 fact I never got in an airplane until I climbed on Trans Texas in a DC3 going from Austin to Dallas to  
9 join the Navy to fly. So that was my first endeavor of seeing what it was actually like to be up in the  
10 air. I was a sophomore at Sam Houston in Huntsville when Sputnik first flew, I knew people were  
11 getting ready to fly in space very soon and I was a little bit jealous that time wise I realized with  
12 Sputnik going up I probably wouldn't be able to click off the squares that were needed to be filled  
13 before they started to put people in space, but I was anxious to do that and my intent all along when  
14 I joined the Navy was to try to get into test pilot school at some time. I had heroes growing up,  
15 people like Chuck Yeager, Scott Crossfield, who were flying. Chuck did Mach 1 the first time. Scott  
16 did Mach 2 and it's nice that I got to know both of those gentlemen very well, consider them friends.  
17

18 Launius: And obviously both of those guys went higher and faster than anybody at the time, but  
19 they did not make the transition into Astronaut Corps You were able to do that and served a  
20 number of years working in that arena. Did you view flying in space as an extension of flying, doing  
21 test pilot work and flying airplanes?

22

23 Crippen: Yes. How high you can go.

1 Launius: Ok.

2

3 {laughter}

4

5 Crippen: And, you know, both Chuck and Scott, who are outstanding pilots, both of them still  
6 are. They were a little bit too old at the time, I was a little bit too young to get in with the Mercury 7,  
7 but was lucky enough to be able to work my way into the space program, so, and joined the Navy  
8 because I wanted to be the best pilot I could possibly be and I figured if I could land on one of those  
9 aircraft carriers I would certainly not be bad.

10

11 Launius: Well, that's for sure. When did you go into astronaut training then?

12

13 Crippen: Well, I spent one tour aboard the USS Independence flying A4s and applied for test  
14 pilot school during that time. Both the Navy and the Air Force have test pilot schools and they  
15 exchange people so for some reason I got picked for the Air Force school and was sent out to  
16 Edwards Air Force Base. At that time both NASA and the Department of Defense were selecting  
17 people to fly in space because DOD had decided that they wanted to do a program they were calling  
18 the Manned Orbiting Laboratory. I applied just in general telling the Navy I wanted to be an  
19 astronaut, was selected through several gates and it got to a point they told me I had to select  
20 between NASA and DOD. At that particular time I thought that NASA probably had more astronauts  
21 than they knew what to do with. This was 1965 and so I selected the Manned Orbiting Laboratory  
22 program and was fortunate enough to be selected for that program in 1966. Had a great time  
23 working on it. We were going to fly out of Vandenberg Air Force Base on Space Launch Complex 6

1 out there, or SLC-6 aboard a Titan 3M, which had solid rockets and we were going to use a modified  
2 Gemini capsule, but as things would happen all of a sudden I woke up one morning and got a phone  
3 call that said, hey the program's cancelled. We didn't see it coming. It was a real surprise to us.  
4 That was June 10<sup>th</sup> in 1969. Probably thought the whole world would come to an end at that  
5 particular point. And, we had fourteen crew members at that particular time when it was cancelled.  
6 We were all wondering what we were going to do. Sitting around and crying in our beer and  
7 somebody, in fact it was Bo Bobko, came up with the idea, why don't we ask NASA if they can use  
8 us? And we all pooh-poohed the idea, saying that, hey, they've got lots of astronauts. This was just  
9 before Apollo 11 and the program was already starting to be turned back some, the lunar program  
10 was. But we ended up asking NASA and went down to be interviewed. Deke Slayton, who was  
11 running flight crew operations at that time, he told us he didn't need any astronauts, had more  
12 astronauts than he knew what to do with, but George Mueller, who was the Associate Administrator  
13 for the Office of Space Flight at that time thought, for some reason, that he ought to take us on  
14 board. And, Deke said OK, I'll take everybody that's 35 and younger. That cut the group in half and  
15 I happened to be, I believe, 31 about that time and, so I ended up being assigned to the Johnson  
16 Space Center at that time known as the Manned Space Flight Center in Houston, Texas. So, it was  
17 a kind of a circuitous route, I snuck in the back door is the short answer.

18

19 Launius: Ok. All right. Well, while you were over in the DOD and you applied to work on the  
20 Manned Orbiting Laboratory and, and were observing what was taking place in NASA from the  
21 military side. What did you think about what was happening there? Were you excited by Kennedy's  
22 decision to say let's go to the moon? Were you somewhat concerned that this might be a fool's  
23 errand, or, how did you feel about that and the progress of Apollo during this period?

1 Crippen: Well, Kennedy's task to go to the moon was just about the time I joined the Navy and  
2 going flying. And, to me it was, that was the same time, Al Shepard had just flown, 1961. And so, I  
3 think I was excited by the fact that people were going into space. It seemed to me that going to the  
4 moon was a logical step for us to be trying to take. It was more of a monumental leap I think than I  
5 personally realized at the time and as I ended up in the, probably a factor in my decision to go with  
6 MOL, I really did feel that there was things that we could do in Earth orbit, focused here on the  
7 Earth. Not only from a military standpoint but from a civil as well, that could be a lot more productive  
8 than going up to the moon, spend a couple of days and come back, because.... Now if we could go  
9 to moon and stay and build a permanent colony up there, or permanent work facility, that's really  
10 what makes a lot more sense to me. However, Kennedy's decision to go to the moon was primarily  
11 a good one by the cold war situation as opposed to a science kind of endeavor, but I was wanting to  
12 help prove that we could work in low Earth orbit and do practical things here on Earth with it.

13

14 Launius: Ok.

15

16 Crippen: And that was certainly one of the things that I had an opportunity to work on since that  
17 time.

18

19 Launius: Right.

20

21 Crippen: But I would also like to see us go back to the moon and on to Mars.

22

1 Launius: You bet. Apollo was a very public enterprise throughout this period and I know you  
2 weren't a part of the program, but were you and your associates paying a lot of attention to what  
3 was happening in NASA during that period and how did you react to some of the successes and the  
4 failures like the Apollo I fire and Apollo 8 and Apollo 11 of course?

5

6 Crippen: Naturally we were interested, but we were also really focused on trying to get the  
7 Manned Orbiting Laboratory going. I can recall, we were at a going away party for General Bernard  
8 Schriever, who was just retiring from the Air Force, out at the Los Angeles Air Force Station which  
9 was where the MOL program was stationed and based out of, when we heard about the Apollo 1  
10 fire. You know, saddened us all. It was a horrible, tragic kind of an accident. I think all of us were  
11 not surprised in that somebody would die along the way. It was just at that particular thing in a  
12 ground test, it was very disheartening. Was very happy they worked their way out of that. Apollo 8  
13 certainly got everybody's attention that, hey, we can go to the moon, and it turned out that when I  
14 mentioned earlier that I was interviewing with Deke Slayton, along with the rest of the crew  
15 members, that was during Apollo 11. We were in Houston at the time and, so we had a chance to at  
16 least be on the fringes of all that. So happens I grew up in Houston and I think I was actually out at  
17 my folk's house during the actual walk on the moon, but I think we were kind of observing it from  
18 afar until the program got cancelled and we knew that there might be a slight chance of us coming.  
19 So it was certainly sparked up our interest, but we were primarily focused again, trying to get the  
20 MOL going and it's one of my big disappointments that program never flew.

21

22 Launius: Right. When you came over to NASA and encountered this different organization,  
23 very civilian organization in many ways, how did you react? What did you think about NASA, the

1 folks at the Manned Spacecraft Center, the other astronauts that you came into contact with and the  
2 activities that NASA was involved in at that time?

3

4 Crippen: Well, I should say that when Deke brought us on board he said, I don't have any flights  
5 for you until probably about 1980. That's when the Space Shuttle ought to be going. So we weren't  
6 anticipating flying anytime soon, but he said, I've got lots of work for you to do in a support role. And,  
7 sounded good to all of us, I along with several of the other guys like Dick Truly, Hank Hartsfield,  
8 were assigned to go work on Skylab at that time and Skylab was just starting to come together so I  
9 was there during the final Apollo landings but I was again focused on trying to make sure Skylab  
10 was ready to fly. My primary work was on the Apollo Telescope Mount. I spent a lot of time at the  
11 Marshall Space Flight Center where that was being worked and was fortunate enough to find out  
12 about Cocoa Beach and the Kennedy Space Center about that time and it looked like a neat place  
13 to me so every excuse I could use I tried to find an assignment to come work down here. In fact, in  
14 the office I think I became known as the mayor of Cocoa Beach for a while, but I had an opportunity  
15 to take the Skylab vehicle through its final phases of checkout, the entire vehicle. Hank Hartsfield  
16 came down and helped me out and another guy at NASA, Rick Nygren. That we looked at it from a  
17 crew standpoint. And it was great. Most of the rest of the astronaut office was really still focused on  
18 the Apollo program, which they should have been. And truthfully, I think, seven of us that came over  
19 from MOL, we were the new guys and truthfully I believe I think I felt like the new guy until it was in  
20 the late seventies, around there, getting close to flying the Shuttle, but knew the rest of the folks  
21 well. They were all very friendly, it was just that they were focused on making sure that we could do  
22 the lunar program. Pete Conrad, who was leading the Skylab effort for us, called me into his office  
23 one day and he says, "Crip, they're going to do this test and I want you to lead it for us." I said,

1 “What kind of test is it?” He says, “Well, they want to lock you up over here in this vacuum chamber  
2 for 56 days to do the ground test on all of the medical activities” and, young naïve Crip, I was ready  
3 to go do anything, so I was assigned along with Bo Bobko and Bill Thornton, to what became known  
4 as SMEAT, the Skylab Medical Experiment Altitude Test, which was run in Building 7 at the Johnson  
5 Space Center. They took the pressure down to 5 psi which is what they flew the Skylab with and we  
6 lived in it for 56 days going through and doing all the medical experiments and what have you. So, I  
7 felt like I was involved in lots of things that were productive for the program.

8

9 Launius: In terms of Skylab, I mean at some level it’s kind of a continuation of the MOL. I know  
10 you were going to do other things on MOL, other than what we did on Skylab, but it is near earth  
11 orbital activities of long duration. Were you excited about basically being able to carry on MOL in a  
12 new agency with a different name and doing somewhat related but different things?

13

14 Crippen: Well, its relationship to MOL was the primary reason that we were assigned to work on  
15 Skylab. Just being able to live in space for a long time you’ve got to have things like be able to get  
16 the potty working. Some rather mundane things that need to be worked out and I believe that’s why  
17 we were selected for Skylab. Skylab had some great things from the standpoint, not only the  
18 medical aspects of living in space, but it had earth observing kind of activities, it had solar observing  
19 with the Apollo Telescope Mount. So it was ground breaking as far as I was concerned with regard  
20 to things that we could do in low earth orbit and truthfully it was our first take at a space station. We  
21 were ahead of the Soviets. I can remember some of the activities we had at that time. We were  
22 starting to work with Soviets a little bit and they were amazed at what we were doing on Skylab.

23

1 Launius: Ok. At what point did you move on from Skylab and start focusing in on Shuttle?

2

3 Crippen: Well, I worked Skylab in the preparatory testing kind of stuff as I mentioned down here  
4 at the Cape. Probably the day we launched Skylab was one of the low points in my life. The  
5 meteoroid shield blew off and we thought we'd lost the whole vehicle and that, but it also showed  
6 me what NASA could do to come together and make it still end up working. Pete Conrad and Paul  
7 Weitz and Joe Kerwin were on the first flight. Went up and did a superb job of getting the vehicle  
8 functional again with initially a sort of a big umbrella thing that was built out at the Johnson Space  
9 Center, and then we subsequently came up with a device that Marshall had put together that  
10 provided additional shielding because the meteoroid shield on the side protecting from meteoroids  
11 was being needed for thermal control and we also lost one of the big solar arrays too, so we were  
12 very low on electrical power. But, I ended up being a cap-com throughout all of the Skylab missions  
13 and those were long flights working around the clock. We did 28 days with that [and] Al Bean's  
14 crew, we did 58 days and then. . . Bill Pogue, Gerry Carr, and Ed Gibson. . . we did the 84 days. I  
15 learned a lot just being on the ground of what it takes to make something like a space station work.  
16 Unfortunately some of those lessons I think got lost prior to going up on the International Space  
17 Station, but they're learning them again. When we finished up that program in '73, Shuttle had been  
18 officially announced I believe in around '72 and I was immediately moved over to start working on  
19 Shuttle. Ken Mattingly was the guy in the astronaut office that was sort of leading the initial Shuttle  
20 activities. Because I had worked the computer programming on MOL and I worked computer  
21 programming on the Apollo Telescope Mount which controlled all of the Skylab activities I ended up  
22 working the computer programs on the Space Shuttle as well. So I got in sort of on the ground floor  
23 of that starting in '73. Had a chance to work it up through its design and one of the nice things about

1 working the computers on the Shuttle was they were connected to everything, so it gave me an  
2 opportunity to learn about the entire vehicle from head to toe if you will.

3

4 Launius: Let's just talk a little bit about the computers on Shuttle during that period. There's lots  
5 of stories that have circulated. I'm sure you've heard them. About, there's more capability in  
6 somebody's little calculator than there was in some of these early computers. Is that a correct  
7 characterization? What can you tell me about the systems?

8

9 Crippen: Computer size, yeah, that's a correct characterization. We were using an early  
10 version of an IBM. On MOL it was even smaller, it was an IBM 4PI, but when we got up to the  
11 Shuttle computers our initial memory was 64,000 32-bit words. And we talk Gigabytes now in your  
12 laptop, so it was very tough to put all of the programs that we wanted to put in there in that small a  
13 computer. We went through scrub after scrub trying to, because the software kept growing out of  
14 that. Eventually we got a little bit more memory, but the displays for example which I was prime  
15 working on coming up with the displays for the crews were not very sophisticated because there  
16 were limitations on software and some of those displays are still flying today.

17

18 Launius: Ok. What was your standard kind of process in terms of working on Shuttle, I mean,  
19 there's a series of about seven or eight years that you're preparing to fly this thing and in the  
20 process of doing that there are issues that arise, there are engineering problems that have to be  
21 resolved and people come and go from the project. And what were some of the major challenges  
22 as you recall them in terms of getting the Shuttle ready to fly?

23

1 Crippen: Lots.

2

3 Launius: And some of them maybe technical and some of them, I know are political.

4

5 Crippen: Sure. Well let me make one point before I go into some of that detail. Somewhere in  
6 the '74 timeframe Tom Stafford called me in and says, "Crip, I'd like you to come over and help out  
7 with Apollo-Soyuz", which he was getting ready to fly with Vance Brand and Deke Slayton. And so,  
8 myself, Bo Bobko, and Dick Truly went over to support Apollo-Soyuz for a period of about one year.  
9 So we had stepped away from some of the software things. Gordon Fullerton actually stepped in for  
10 me and picked up some of the work that I'd been doing. We had formal management boards that  
11 looked at everything from the hardware design. Aaron Cohen was the Orbiter program manager.  
12 Arnie Aldrich primarily was working the software activities for him and they used control boards to  
13 get approval for any modifications or changes that were being put in and so there was a nice formal  
14 process where people wrote out a change if you wanted to change something that wasn't working  
15 properly or wasn't like you thought it should be and you worked that change through the board to get  
16 it approved or disapproved. I believe the process worked very well. They still use similar boards  
17 today for program approval of various aspects. My activities were primarily focused at the Johnson  
18 Space Center. The Marshall Space Flight Center was doing all of the propulsion elements and even  
19 though we were seeing them and interfacing with them most of the activity we had was located there  
20 in Houston. We did have budget problems but those weren't at least immediately on my mind. I  
21 was primarily making sure that the vehicle would do the kinds of things we would want to do, as an  
22 example, scrubbing on weight. We started out with the Orbiter having a drag chute and . . . they  
23 decided the vehicle weighed too much back in the back end so they wanted to take it out and we

1 debated that extensively. I can remember Max Faget saying, “Hey this vehicle will roll to a stop  
2 without you guys getting on the brakes in a 15,000 foot runway so its not, not required.” That was a  
3 decision I think that was wrong, we later ended up putting a drag chute back in, but it did get the  
4 weight down. So we did those kinds of trade-offs that were necessary early on to get the vehicle  
5 flying and we had technical problems and anytime you do something as challenging as the Shuttle  
6 you’re going to have technical problems and that ended up stretching the schedule. That ended up  
7 making it cost more. So, one of the things that I think that NASA, we’re all eager to do things and  
8 we’re a can-do kind of an organization and the nature of government budget approvals always  
9 makes budgets small or tries to tighten them down to as small as they can get them and the NASA  
10 folks go out and try to do it the best they can, but inevitably they don’t have enough contingency  
11 money to look at the unknowns that invariably sneak in. That’s been true of just about every space  
12 program that I’ve ever worked on and its not that people are lying up front as to how much money  
13 they think they can go do something for—it’s that they want to do it. They feel, hey, it’s a challenge  
14 and they’ll go try it, but it has hurt us every time we’ve tried to do a program. There’re probably a  
15 couple of exceptions to that, but in general that’s been the case. Of course the main engines, we  
16 were having problems with, they were technically big steps as far as propulsion was concerned. It’s  
17 not surprising that they ran into problems, but over at Stennis Space Flight Center where we were  
18 testing them out, we were blowing them up right and left and our thermal protection system, or our  
19 tiles, the glue we used to put them on wasn’t working out very well so they were tending to fall off,  
20 but the whole scenario was let’s keep on moving. I remember when Columbia was moved from  
21 Palmdale here to the Kennedy Space Center, the guys at KSC said, hey, this vehicle is not ready to  
22 come here. It’s got too much work yet to go on it, but other forces saying, yes, it’s time to move on.  
23 So, it got here and sure enough it took as long as KSC said it was going to, simply because they

1 knew how to process things to go fly and the time it took, so it ended up sitting here being built as  
2 opposed to out in California. So, John Young and I were picked to fly. I think George Abbey told  
3 me I was going to be lucky enough to fly STS-1 somewhere around 1978. At the time I believe we  
4 were thinking we were going to fly in '79. We ended up flying in '81 and. . . we'd repaired all those  
5 things that we thought were necessary prior to that first flight, but there were some struggles going  
6 on.

7

8 Launius: The Shuttle is, well I firmly believe it's one of the most remarkable vehicles, maybe the  
9 most remarkable vehicle ever built. But there're some people who have suggested that NASA's  
10 reach exceeded its grasp when they tried to do it. That it is reusable, or at least partially reusable,  
11 but some people were talking about throughput and flight rates of more than 50 flights a year and  
12 things of this nature. How did the folks who were working on the program feel about those kinds of  
13 comments? Cheap, reliable, easy access to space is a phrase that's used a lot.

14

15 Crippen: And that certainly was the intent back when we concluded the lunar program. NASA  
16 was looking for its next big thing to go work on. Truthfully, I think the main feature we wanted was a  
17 space station, but before we could do that I think the consensus was that we needed a way to get  
18 up and down more economically and it so happened some of the people in DOD were also looking  
19 for ways to get up and down more economically and, all the political factors that came together at  
20 that time said the Space Shuttle's the way to do it. Its design was primarily driven by the  
21 Department of Defense requirements and, at least on paper, one of the ways you can make a  
22 vehicle, a reusable vehicle look good is, the more you fly it the cheaper it is to fly. I never thought  
23 that it could fly 60 times, or whatever, people got down to 24, we said ok, maybe we're getting down

1 to something more reasonable. I personally believe the Shuttle could do a flight rate somewhere on  
2 the order of about 15 or 16 fairly comfortably. So, anytime people talk about new vehicles, things  
3 like X-33 and some of those, they tend to do the same thing, put high flight rates in there and the  
4 high flight rates are only going to be there if the payloads are there to accompany them and people  
5 say well the payloads aren't going to be there until you can get the cost down. So, I think we'll  
6 probably iteratively get there at some point in the future, but for what we did with the Space Shuttle,  
7 I think it was probably a miracle we got what we got for the money we invested and that it can do  
8 what it can do. It does take a lot of TLC and that TLC costs money.

9

10 Launius: Yeah, and it's very much an experimental vehicle right up to the present, but it's a  
11 remarkable one. Well, you and John Young fly the first mission. How did you go about preparing  
12 for that?

13

14 Crippen: Train, train, train

15

16 {laughter}

17

18 Crippen: Flying the first one was a little bit unusual in that we and the trainers were all learning  
19 together about how the vehicle worked. First part we built a simulator, actually two simulators, one  
20 a fixed base and one a motion base. An important ingredient was modifying a Gulfstream II to be a  
21 Shuttle training airplane. We spent a lot of time in both the simulators and the Shuttle training  
22 airplane preparing for the flight. I spent some time in an underwater tank, preparing to do a solo  
23 space walk if we needed to do certain things to get the vehicle home, like close the payload bay

1 doors. We had a lot more time to train than what we had originally thought that we were going to  
2 have. We were planning on about a year and we ended up with about three years. John and I each  
3 had probably around 1500 approaches in the Shuttle training airplane and we had simulations  
4 where we dreamed up every contingency that anybody could possibly imagine and then some,  
5 wrote procedures for them, and unfortunately, some of the crews are still training through those  
6 procedures today, a lot more complex and fearsome than are probably required for the vehicle  
7 today, but a lot of time in simulators, a lot of time in the swimming pool, a lot of time flying the  
8 Shuttle training airplane. One of the things we actually ended up going through that was sort of a  
9 perturbation, I mentioned earlier, the tiles not adhering to the vehicle very well and that made a lot of  
10 people nervous, so they started coming up with all these scenarios as to what we could do about it if  
11 some of the tiles on the bottom fell off. And the answer from my standpoint was nothing, but we  
12 were looking at ways that I could, in a space suit, go, try to work my way around to the base of the  
13 vehicle and glue tiles on. Went through some simulations for that and the more we did it the more  
14 the conclusion came back, this is not practical, let's just make sure that they're glued on properly  
15 before we go fly and thank goodness that's what we did. Spent a lot of time in tests down here at  
16 KSC. We went through more countdown tests, testing out the vehicle because, you know,  
17 simulators are one thing, but especially if you haven't flown the vehicle before you need to see the  
18 hardware, so went through a lot of those. I can remember first time John and I went out to the  
19 launch pad to look at some of the escape systems out there and of course I'd been around during  
20 the Apollo program and Skylab. It used to be that if you're ready to come down off of the tower you  
21 rode this wire down and the fire crew was waiting down at the bunker along with a little tank to take  
22 care of you. So I was going through the exercise and I said, "OK, where's the fire crew going to  
23 be?" and they said "Back there a couple of miles."

1 {laughter}

2

3 Crippen: They said, you guys ought to take care of that on your own. So there was a bunker  
4 and a tank and it was one of the fun training things was to learning to drive that little vehicle.

5

6 Launius: Ok. Obviously you did a lot of simulations and you flew the Gulfstream. Did you find  
7 that there was real good high fidelity between those simulations and when the actual vehicle itself?

8

9 Crippen: The Gulfstream is an excellent vehicle for training folks how to land. It only loses its  
10 fidelity if there's a lot of turbulence going on, because the nature of the Orbiter is it just plows right  
11 through bumps. The Shuttle training airplane responds to any turbulence you have. But I found it an  
12 excellent vehicle. I think John did too. We made some tweaks in it after that first flight, but folks did  
13 a super job on that. The simulators were good. Again there was some minor variations that we had  
14 to come back and correct after we flew the first time, but it was good training, too. Folks really did a  
15 good job on that.

16

17 Launius: Ok. And the Shuttle itself. What's it like to fly? I mean, you've flown lots of airplanes.  
18 How is this alike or different from those others?

19

20 Crippen: Well. It's remarkable that, through computer programs you can get a vehicle that's big  
21 and bulky looking as the Space Shuttle that flies like it does. It's probably because most of the  
22 astronauts were in small airplanes, fighter attack kind of airplanes. The flyers put the gains into the  
23 software system so that the vehicle is so responsive and it flies and responds to the stick controls

1 just about like any small airplane would. Roll rate is not as fast as flying an F-14 or something like  
2 that, but its response is excellent. Again, it's not an airplane, so the approach which is a low lift to  
3 drag kind of approach is something that I'd trained [for] early on when I was out at Edwards, when I  
4 was going through test pilot school we were training for lifting bodies and those kinds of things and  
5 the Shuttle actually has more lift than all those vehicles do. So the approach, while it's not like  
6 you're making a commercial airliner or even in a fighter airplane, it was something that we had  
7 trained for during flame out kind of approaches, so from my standpoint it was a pleasure to fly. The  
8 launch is something that I had listened to all the guys and one of the great things [was] to fly with a  
9 guy like John Young, who had at that time four previous flights from Gemini on up to Apollo, so I'd  
10 listened to everything about train wrecks during first stage and felt a great deal of confidence with  
11 John sitting there beside me when we lifted off that first time. The vehicle unlike all of the launch  
12 vehicles I'd seen before doesn't lumber around when you light the engines. It, as soon as the solids  
13 light, it gets up and moves out mainly because the thrust to weight ratio was much higher than  
14 anything we'd done before. First stage is kind of bouncy. Not violent, but I'd likened it to me driving  
15 my old pickup down a washboard country road. You know that you're trying to take this complicated  
16 vehicle, complicated from a shape standpoint through Mach I and all those little shock waves are  
17 moving every which way around here. So you would expect some of that. But after you get rid of  
18 the solids and you go on up into orbit, it's just as nice and comfortable as you and I sitting here in  
19 these chairs. It's a neat, neat vehicle and even though there's not a lot of room inside it really does  
20 open up when you get it up in zero-g and you're floating around especially on the first flight when it  
21 was just John and I. [It has] a lot of room. Of course the bad side of that was I found that wasn't  
22 many of us to do the work, so. . . {laughter}. . . I rarely got to look outside on the first flight. It was

1 nice being commander on the subsequent flights when I had other folks to take care of some of the  
2 chores.

3

4 Launius: Ok. All right. There's a lot of excitement that surrounds the launch of Columbia in '81  
5 and you were caught up in all of that. Obviously returned to space after having been out of it since  
6 1975, at least with people and there's this remarkably new vehicle that's reusable and has wings on  
7 something entirely different and I can recall watching that flight and especially the landing a couple  
8 of days after you had launched where there was concern about the tiles. Would everything go  
9 [okay]? And Walter Cronkite is there watching this and breathes a sigh of relief when you all land  
10 and you guys kind of get out of the craft and walk around, check it as I recall. Can you speak to  
11 something about the enthusiasm that was experienced both by yourselves as well as kind of the  
12 general population during that first flight?

13

14 Crippen: Well, preparatory to flight, one of the good things that NASA does is pretty well isolate  
15 the crews from all of the falderal that's going on; the press conference and a few of those kind of  
16 things, but, I don't we, John or I, we were excited. This is something we were working on a very  
17 long time but I don't think we sensed the kind of a mood that was out amongst the public. You  
18 know, it was a time we'd had hostages in Iran and several other things, I don't believe the general  
19 morale in the United States was very good so, I think everybody was looking for something to say,  
20 "Hey, we did that," and the launch of Columbia kind of turned out to be that. We didn't have an idea  
21 of what was going on at the ground very much. I will say with regard to the tiles, of course you know  
22 that people had been worried about them prior to flight and soon as I opened up the payload bay  
23 doors on orbit and I looked back at the rear of the vehicle on our orbiting maneuvering system pods,

1 our OMS pods, some of the tiles were gone and I think that had people wringing their hands, well if  
2 those are gone maybe some of the ones on the bottom are gone. So that probably caused some of  
3 the heightened concern with regard to the tiles. John and I both knew that we had been very careful  
4 to go through and do pull tests on all the ones on the bottom. We hadn't done some on the OMS  
5 pods because we knew they weren't as critical. So I really didn't have, nor did John, that much  
6 concern with regard to the tiles being gone. But it did cause, I think, some excitement on the  
7 ground. When John and I were coming in for a landing I was about as excited as you could get. I  
8 think I exclaimed something about when we come over the coastline landing at Edwards, about  
9 what a way to come to California, cause you're moving very fast coming across the coast and I'd  
10 flown into California lots of times but not from that particular direction nor going that fast. When we  
11 came over the base and started our turn I could see there were lots of folks down there on the lake  
12 bed, but then we didn't pay much attention to that because we were primarily focused on the activity  
13 getting it down on the ground. When we got out they, John came out first because somebody had  
14 to sit in there and make sure the vehicle was all secured until we got a support crew in, so I was a  
15 little bit late getting out, but I was just as excited as he was. They put us in a vehicle and took us to  
16 this grandstand and, we had the Governor of California and a bunch of other bigwigs there to greet  
17 us. One of the exciting things I can remember was the grandstand, there was people all the way  
18 around. When I was a kid in Houston growing up I used to go to the rodeo every year and they  
19 invariably had either Roy Rogers or Gene Autrey come to the rodeo and they'd ride around and I'd  
20 go down and stick my hand out to shake hands and I looked at all these folks who were crowded  
21 around out there and there was Roy Rogers standing there.

22

23 {laughter}

1 Crippen: So I had to go over and shake his hand.

2

3 Launius: That's great.

4

5 Crippen: But that was an exciting time and then John and I got put on the roast chicken circuit,  
6 traveling around not only the United States, but Europe and Australia as well and we, not we, the  
7 program generated a lot of excitement and pride, not only here in the U.S., but with our allies abroad  
8 and it was kind of nice to see that kind of spirit amongst the public.

9

10 Launius: The Shuttle is a tremendous symbol of American power and influence. It's recognized  
11 world over and so the public relations value of it is obviously what you were playing to at some level  
12 there. But you flew lots of other missions and are there any particular stories, anecdotes, events  
13 that took place during that period that you'd like to talk about?

14

15 Crippen: Probably lot's but I'm not sure how many I can share.

16

17 Launius: Go as long as you like.

18

19 Crippen: Well, my second flight, in which I had an opportunity to command, had the most  
20 excitement because that was the first flight of a woman from the United States. That was Sally Ride  
21 was on that and it was Sally Ride's flight. The rest of us crew were just there, but the biggest thing  
22 was trying to protect Sally from all of this. . .

23

1 Launius: Hoopla.

2

3 Crippen: . . . activity that was going on at that time so she could concentrate on the mission.

4 But, it was a great flight. I remember I got into some trouble with some of my bosses back in

5 Houston because on orbit we were passing cameras back and forth to one another by (makes

6 swooshing sound to imply a gentle toss). I mean that's the easiest thing to do. We've got lots of

7 cameras but when I got back in Houston they said, "You know you shouldn't be tossing things

8 around in the cockpit like that." We were really just slowly passing them, but. . . oh and we also, that

9 was STS-7 and we were deploying a satellite that had a camera on board and we thought, hey, it'd

10 be neat to take the Remote Manipulator System, put it in the shape of a seven, and take a

11 photograph of it from the satellite that we had out there. Course that was part of our patch. I heard

12 about that when I got down here too.

13

14 {laughter}

15

16 Crippen: But it turned out to be a neat picture. And I had a chance to fly the first rendezvous,

17 true full rendezvous flight when we went up and rescued the Solar Max Satellite. We had worked

18 this idea where George or Pinky Nelson was going to fly a Manned Maneuvering Unit out and had

19 this special device that was going to interface with the Solar Max satellite and we were going to

20 capture it and fly it back into the payload bay. Well Pinky flew out there and did his little capture

21 thing just like he was supposed to and didn't capture it, so he pulls back and hits it again and by that

22 time the satellite starts tumbling and we thought we'd really lost the mission there. I made an

23 attempt to try to free grab it but it was tumbling too much, but we backed away and the ground

1 managed to get it stabilized enough where we could actually just come in and capture it with the arm  
2 which we probably should have done in the first place if we knew they could have slowed it down  
3 that much, but when we missed the first time I could just see myself up in Washington for the next  
4 six months trying to explain why we didn't capture the satellite but it all worked out, worked out well.  
5 And then I had a chance to fly with Sally again and also Kathy Thornton on Mission 41G. We were  
6 doing something a little bit different. We were supposed to be flying all these missions like you  
7 talked about earlier so somebody wondered, well how fast can we turn the crew around. Well they  
8 put me such that I was supposed to turn around in six months, "Well, I can do it if you give me  
9 somebody that I've flown with before to start working with the crew," and that was one of the  
10 reasons that Sally was on that flight and she did a super job bringing everybody along so that I could  
11 step in late and that was a great flight. First woman to do a space walk here in the U.S., that was  
12 Kathy Sullivan and a great mission from my standpoint. If I've got one regret in my flights though, I  
13 was assigned to command the first flight out of Vandenberg which was going to be a DOD flight out  
14 of that same launch pad. . .

15

16 (Simultaneously)

17

18 Crippen: SLC-6...

19

20 Launius: SLC-6.

21

22 Crippen: . . . that we were supposed to use on MOL and we were well along on our  
23 preparations to go do that flight. It was unusual in that it had Pete Aldrich who at that time was the

1 Undersecretary of the Air Force was going to be one of the payload specialists on board. And we  
2 were actually training for one of the payloads at Los Alamos, when we lost Challenger, and of  
3 course all that went by the wayside.

4

5 Launius: Yes. Well, let's talk a little bit about that. There are 24 flights that take place between  
6 '81 and the first part of '86. The 25<sup>th</sup> flight is Challenger. It's a tragedy, no other way to explain it  
7 and what was the morale of the folks working on the Shuttle program and what were the feelings, I  
8 guess, in the sense of where you all were at that particular time and how you were going to get out  
9 of this in terms of recovering from the accident, or did you think about that at all?

10

11 Crippen: Well, our morale was certainly about as low as you can get.

12

13 Launius: Yeah.

14

15 Crippen: For everybody from the janitors working in the buildings up to the Center Directors and  
16 the. . . Washington, at that time we were a little bit messed up as far as administrator. . .

17

18 Launius: Right.

19

20 Crippen: . . . but, our initial shock was, how could this possibly happen, then, being our nature,  
21 we said, "Let's go figure it out." That's when we got into the investigation. I was assigned one of the  
22 roles in the investigation primarily helping the NASA team that was formed to support the Roger's  
23 Commission. So I spent a great deal of time down here at KSC again going through the recovery

1 operations and trying to make sure that we knew what happened and we, of course we did find the  
2 problem with the solid rocket motor. And once we had the problem, physically, that we realized  
3 ahead there was quite a few other things about the vehicle that needed to be fixed, not only from a  
4 hardware standpoint, but just how we managed the program. And I got drawn into going up to  
5 Washington and helping addressing some of the concerns that had been raised as a result of the  
6 investigation and I think, at least I personally felt and I believe most people involved felt that we've  
7 got to get this thing back flying again, that's what the Challenger crew would have wanted and that's  
8 what we believe is right for the country, so our focus was, hey, let's go correct the things that are  
9 wrong so that we can go fly again and fly safely.

10

11 Launius: Ok, (comment to recording person), Let me ask one more question and then we'll take  
12 a break. You [were] pretty heavily involved in the recovery effort, I'm sure that's true of everybody  
13 working on the program, but, yourself, Dick Truly, and some other folks like that were pretty  
14 instrumental in the whole process. It takes a couple of years basically to get the Shuttle program  
15 back on track and in the fall of '88 STS-26 goes up with Rick Hauck and company. Can you speak  
16 to any of the kind of key decisions that were made, key changes that were made to bring the  
17 program back. I mean obviously there was a restructuring entirely of the o-rings and the solid  
18 rockets, but beyond that were there some other specific things you would like to mention?

19

20 Crippen: Well, as I said, I did go up to Washington to support Dick Truly who had been pulled in  
21 as Associate Administrator for the Office of Space Flight. And, one of the things that I at least  
22 concluded, partly, [from] some of the data that came out of the Roger's Commission was that we  
23 really needed to have more operational people involved with some of the launch decision process

1 and I worked with Dick Kohrs, George Page, and Walt Williams, trying to go pull together the answer  
2 to several of the questions and one of them was the management aspects of the program. And out  
3 of that came up a management process and a launch decision process that was more crisp, I guess  
4 those are the words I would use, than what we had had before. And part of that in responding to the  
5 operations question I actually recommended that we have, we had a director of the program, but  
6 that we have a deputy director for operations and put that function here at the Kennedy Space  
7 Center. We further recommended that the program director ought to be located in Washington and  
8 that the other Centers would come in to support that. NASA's real strength lies I feel in its Centers.  
9 That's where the technical folks are, the real basis for getting things done, but a flaw that we had  
10 gotten ourselves into at that time was, the Centers are very competitive. It's their very nature,  
11 especially the Johnson Space Flight Center and the Marshall Space Flight Center and the real  
12 function of Headquarters is to coordinate that and to control budgets. If you get into a situation  
13 where one Center is controlling another Center's budget it leads to no good and I think that's one of  
14 the problems that caused some of the communication problems that we had. We can go ahead and  
15 stop there and I can pick up later.

16

17 Launius: Ok. All right. That sounds fine. All right.

18

19 Part II

20

21 Launius: Let's talk a little bit about your experiences as the KSC Director. When did you come  
22 aboard in that task, and how did that happen, and what was your first kind of major challenges that  
23 you started to wrestle with?

1 Crippen: Well, after serving down here at KSC as the Deputy Director of Shuttle Operations for  
2 a couple of years I was requested to come up to Washington to [be] the Director of the Shuttle  
3 Program to take over for Arnie Aldrich. So I spent about two years in Washington and truthfully  
4 about two years of Washington was all I could take.

5

6 {laughter}

7

8 Crippen: You know, it's a great town and all that, but the politics and the way things work  
9 sometimes drove me a little bit crazy. And, I was asked how I'd like to be Director of KSC. Forrest  
10 McCartney had the job at that time and I said it's one of the greatest jobs in NASA, so, yep, given  
11 the opportunity I'd love to go do it. And, so in January of. . . '92, I think, I came down and took over  
12 that job. Great people. I'd worked, like I said since I'd first found out about KSC, I came down here.  
13 . . So I knew the people very well and felt like I'd come home, truthfully. One of the things that we  
14 were going through at that time was, [there] was a lot of pressure again to cut budgets. And the  
15 spending had really ramped up after we'd lost the Challenger to try to correct things and now people  
16 wanted to try to get them back under control. So there was a lot of pressure to reduce the spending,  
17 and that was one of my tasks, to try to figure out a way to do that and to do it safely. And one of the  
18 things I'd picked up on was some of the quality management techniques that were in existence at  
19 that time and we instigated some of those things here at KSC and were successful and we did bring  
20 costs down and, by close to twenty-five percent on what we had been spending on our budgets.  
21 Learning how to work a little bit more efficiently. It's been a personal thing for me but because I had  
22 three daughters and flew with Sally who used to remind me it was not manned space flight it was  
23 human space flight on a periodic basis, to try to do a little bit better as far as diversity in the work

1 force, not only with females but Hispanics and African Americans. So I worked on that very hard;  
2 made some small amount of progress. Wished I could have made more. It's a tough issue to work.  
3 Had a great safety record. That's something I'm really proud of, both for the folks working on the  
4 ground and the missions were clicked off pretty good during that period of time. So it was one of my  
5 highlights. Spent three years doing that and came to the realization that if I was ever going to do  
6 anything besides work for the United States Government I was probably at an age where I needed  
7 to do that so made the decision that three years was probably time to move on. And maybe it's part  
8 of my military training, but I found that somewhere in about three to five years in a job is where I  
9 think you ought to start looking for something else to do. Things start seeming too repetitious. You  
10 start correcting your own mistakes. So, that was a factor as well in deciding it was time to move on.

11

12 Launius: That's understandable. You mentioned safety and you're very proud of that. Let's talk  
13 about that for a second. Are there any specific recommendations, if you were talking to somebody  
14 who'd just been appointed say as the Center Director someplace at KSC and you wanted to give  
15 them some advice on how to carry out a good safety program what would you tell them? I mean  
16 this is a really key issue.

17

18 Crippen: Well I wouldn't try to tell any other Center Director how to. . .

19

20 Launius: I understand.

21

22 Crippen: . . . how to run a Center. But, in talking safety first thing you got to do is let all the  
23 employees know that that's important. Then you have got to follow through and show that it's

1 important by taking personal interest. You can't delegate it to anybody. You might have somebody  
2 that's kind of focused on it, but the head of the organization has to show that they care about that  
3 and react accordingly. We do things like give evaluations, give rewards, and give punishments, for  
4 when somebody does something they shouldn't be doing you have to act on it. When they do  
5 something they should be doing you have to reward them for it and let people see that. So, safety is  
6 one of these kinds of things you got to pay attention to continuously and you've got to heighten the  
7 people's awareness of. The short answer, I can give you another couple of hours on that.

8

9 Launius: Ok. All right. How did you find the workforce here? Was it highly motivated, very  
10 professional? I'm sure your answer to that is "yes" and what were some of the particular emphases  
11 that you tried to instill in that workforce. Forrest McCartney for instance, when we interviewed him,  
12 said that he was very focused on quality of life for those folks. That it's an underappreciated crowd  
13 and he wanted to try to boost that a little bit. Did you have a similar experience?

14

15 Crippen: Well, they are certainly underappreciated I think. One of the things that I found, the  
16 first time I showed up at KSC back in around 1970, was the pride that everybody feels about being  
17 part of the space program. And again, that's everybody from the Center Director to the Launch  
18 Director to the person that's cleaning out the halls, people that work in the cafeterias. Everybody is  
19 really proud of it, and, it's hard to see badges at KSC. There are lots of contractors and lots of civil  
20 servants but they all kind of blend together and everybody feels like they're part of the place. So,  
21 the main thing you've got to do is to let folks know they're important and again try to demonstrate  
22 that to them in the way you behave. Also, the best thing you can do with them is to be honest, not  
23 only at KSC, but at a lot of organizations and companies the work force doesn't trust the

1 management. They feel so far removed from them that they think that people are trying to do them  
2 in. So, you've got to be honest and hopefully be as visible as you possibly can. Get out, and I  
3 learned more throughout my career out walking the halls than I ever learned sitting in a conference  
4 room anywhere. So, trying to let the work force know that you're accessible, that they can talk to  
5 you [if] they've got a concern that you're willing to listen to it, is extremely important. So, I think the  
6 folks that work at KSC, who've gone through the rollercoaster ride you do in the space business as  
7 far as employment is concerned have got some of the strongest motivations of any employees I've  
8 ever encountered.

9

10 Launius: I've heard other people suggest that the KSC workforce is sometimes viewed by other  
11 Centers and maybe Headquarters as kind of their employees to go boss around. (Laughter) How  
12 were your relations and how did you interface with JSC and Marshall and Headquarters while you  
13 were here?

14

15 Crippen: For me personally, you know having grown up at JSC, having worked at Marshall a  
16 great deal of time, having spent time at Headquarters, I knew what those Centers and what  
17 Headquarters contributes and I know what KSC contributes. And I was able to work that at least at  
18 the Center Director level and had no problems with it. Truthfully, KSC is launch operations from my  
19 standpoint. That's why the Center was originally put here. There are some other things they do, but  
20 that's their real expertise. They're kind of where the rubber hits the road from the other Centers. It  
21 is true that I have seen in the past where some of the other Centers feel like hey this is my hardware  
22 so you ought to go do this to it. But it was back to the point I was making a little bit earlier, you can't  
23 get the Centers where one's bossing another. It doesn't work. It really doesn't. It causes ill

1 feelings, causes people not to communicate, which is the worse thing you can do in this business.  
2 People will tend to stand up and salute a Headquarters no matter who's up there, recognizing that  
3 they're not competing or whatever for the business. So I think that's something that NASA has to  
4 continually watch out for, when they see one Center pulling too much on another one there needs to  
5 be some kind of safety valve to go address those problems and I know it comes up periodically.  
6 And it's not only here at KSC, I've seen the same thing between the other Centers and it's also true  
7 of the primary aviation centers, Langley, Ames, Lewis, it's not Lewis anymore it's Glenn.

8

9 Launius: Now Glenn. Right.

10

11 Crippen: But they've got the same kind of problems. So it's something that NASA needs to  
12 watch out for and make sure that they've got people up in Washington that understand that. One of  
13 the things I really tried to do while I was here was to encourage KSC employees to do tours of duty  
14 up in DC, was reasonably successful at that. I think that I've always told them that – hey go up  
15 there for a while and then when you get one of these weird calls you better understand why it's  
16 being made. (cell phone ringing – Crippen says, "Why don't we hold up for a minute. Somebody's  
17 after me.)

18

19 Launius: All right. Can you guys pause this for a sec?

20

21 Crippen: (Answers phone.)

22

1 Crippen: As I was saying, getting people from the Centers to go up to Washington gives them  
2 the unique perspective of seeing what their Center is like when they're not there because it's  
3 different. I mean you get a different viewpoint sitting in Washington then looking at your Center.  
4 And then when they come back to the Center they understand better what Washington is, what it  
5 needs and why it's there. The more NASA can stir the pot and move people around, even between  
6 Centers, is good. They don't do enough of that.

7  
8 Launius: Yeah.

9  
10 Crippen: That's part of my military training.

11  
12 Launius: Yeah, that's one of the things the military has always done very well. Move the corps  
13 around and move the group forward. When you arrived here were there particular new directions,  
14 new approaches that you intended to take towards KSC?

15  
16 Crippen: You know, as far as I was concerned they had done a super job here. The only thing  
17 was that I had had some new direction regarding budgets and we needed to tighten down on them  
18 and so that was the only major new focus and trying to find a way to do that that didn't compromise  
19 what it is that we were trying to do and doing it safely.

20 Launius: One of the unique things about KSC is its relation to the military side of the house  
21 here, you have to share the range and cooperate. How did that go while you were here?

22

1 Crippen: Super. Jimmy Morrell had the Air Force side for a while while I was here. Bob  
2 Dickman came in and had it for a while and I had an excellent relationship with both of those  
3 gentlemen, still consider both of them friends today. I'm really pleased at what Roy Bridges has  
4 been able to do. Since Roy had actually had the Air Force side at one time in his career he's been  
5 able to move that even further than either Forrest or I could have, I believe.

6  
7 Launius: Okay. And something that kind of gets lost in the shuffle most of the time when we  
8 talk about KSC is the whole ELV system. I mean obviously a focus and a central focus here is  
9 Shuttle. . .

10

11 Crippen: Right.

12

13 Launius: . . . and the activities associated with human space flight. But was there an expansion  
14 and a growth and how did you treat the ELV Delta, Atlas, Titan folks?

15

16 Crippen: I treated it like it was important. (Laughter) I mean if you lose one of those that's an  
17 awful lot of money as well. There might not be any people onboard but quite a few of those  
18 satellites are up in the billions of dollars so it was a high priority to us to make sure that we had a  
19 process that resembled and we'd done this following the Challenger, taking some of the activities  
20 that we had to not only use them on Challenger but to use them on EELV's as well, and mainly to  
21 carry them out. But I thought again, Forrest McCartney had done a super job on those. One of the  
22 things that again following Challenger we put in place were some weather rules that we coordinated  
23 on both sides between the Air Force and KSC, put people in that would have some longevity as

1 opposed to forecasters that cycled out of here every couple of years, so they could really  
2 understand the KSC weather which is kind of unique and those are things that are used on both  
3 sides of the house as far as launches are concerned. . .

4

5 Launius: Okay.

6

7 Crippen: . . . either Shuttle or ELV's.

8

9 Launius: A lot of success. Were there frustrations?

10

11 Crippen: Frustrations. Every time I'd get a call to come to Washington probably.

12

13 (Laughter)

14

15 Launius: Okay.

16

17 Crippen: No, well, I'd mentioned earlier, budget cuts, rollbacks, those kinds of things, trying to  
18 find a balance so you're not doing something too fast was always a challenge. And we ended up,  
19 NASA was doing another one of their studies they call a Zero-Base study, about that time where  
20 they were going in and looking at all the Centers again and trying to understand what was required  
21 with regard to minimum amount of workforce and we were supporting that very well. Probably one  
22 of the biggest challenges I had while I was here was we had a strike by the International Association  
23 of Machinists against our Base Operating Contractor and that strike went on over a hundred days

1 and I was getting calls out of Washington about why isn't this strike being resolved, not only from  
2 NASA Headquarters, I was getting calls from Congress as well, so that was some unique  
3 challenges, but we managed to finally get the parties together and resolve that. But, and then  
4 another one speaking of the Base Operating Contract, we competed that while I was here. Made a  
5 decision about who ought to be the winner, had it protested, went back through it again and ended  
6 up switching contractors that were selected. So that caused quite a bit of trauma as well. So we  
7 had some fun.

8

9 Launius: Okay. All right. When you leave KSC you move on to Thiokol. Can you tell us a little  
10 about the differences in terms of kind of public and private in terms of dealing with issues? It's not  
11 dissimilar in terms of being the head of a major organization.

12

13 Crippen: When I did leave KSC, which I told you about, I purposely had not hunted for a job  
14 while I was still employed simply because of the nature of the positions I had been working in. You  
15 know it's very easy to get yourself into problems from a legal standpoint. So I went job hunting after  
16 I retired from NASA, spent about three months doing that, and ended up going to work for Lockheed  
17 Martin over in Orlando at their Information Systems Company doing simulators and logistics  
18 systems, things having nothing to do with space. And it was there I started to learn a little bit about  
19 probably more about the financial side of working with industry. I think I found that whether you're  
20 working in the government or whether you're working in industry you're worried about people,  
21 processes and money. And the money focus is a little bit different since you're trying to earn a profit  
22 when you're in industry but it's still making sure that where you're spending money you know you're  
23 getting the most for it. I ended up having an opportunity after I'd been over at Lockheed Martin for

1 almost a couple of years of going out to work at Thiokol in Utah which was a great job, great  
2 employees out there, what they do to contribute to the space program and the Shuttle as well as  
3 ELV's and national defense I found very rewarding working on. And I found that working with  
4 people and working with the processes was very similar to what I had experienced here at KSC. I  
5 did find that working on the financial aspect was somewhat different but still very related to what I  
6 had learned while I was working in government. I consider myself a lucky person having had an  
7 opportunity to work on the initial design of the Shuttle, fly it, work in the management of it within  
8 NASA, and then within one of its major contractors, you know I've made the Shuttle pretty much of a  
9 career over all of these years.

10

11 Launius: In terms of kind of where things may be headed in the future, one of the points that  
12 you made early on was that you really thought the MOL program was great because learning how to  
13 do long duration activities in earth orbit. Shuttle was a compromise, as you mentioned earlier, we  
14 really wanted to build a station. 1984 NASA gets the task to do this and we've been laboring at this  
15 now for a long time and . . .

16

17 Crippen: That's one of the biggest understatements . . .

18

19 (Laughter)

20

21 Launius: Okay. But I mean there are pieces of it are up there and there's a crew aboard. Could  
22 you reflect a little bit on space station and what you see, how that has evolved and what you might  
23 expect from that in the future?

1 Crippen: Well, as you say, the whole idea initially was that NASA wanted to build both the  
2 Station and the Shuttle simultaneously. It costs too much money, couldn't afford to do that. So we  
3 built the Shuttle and then we built the Station at least that's the track we were on and that's why in  
4 '84 they did announce that we were going to go build the Station. The Station has been through all  
5 kinds of throes both from a design standpoint but primarily from a political standpoint it's been  
6 tossed around every which direction, redesigned and redesigned and redesigned and most of those  
7 not driven by NASA but driven by politics and budget. It is fantastic to me that we've got the vehicle  
8 up and flying. I'm extremely pleased and delighted at how well it is integrated together and been  
9 functioning fantastically on orbit. One of my biggest concerns when I was Center Director here and  
10 we were building what is now the Space Station Processing Facility was that there was this big  
11 mindset that it was "ship and shoot." That we were gonna ship it down to KSC and we were gonna  
12 shoot it and we weren't gonna do any testing on it or bare minimal testing. That defies every lesson  
13 of space flight that we've ever learned and one of the good things that came out of some of the  
14 problems that we've had from a financial standpoint was that, and primarily because of the Russians  
15 being delayed, was that they had a chance to get the hardware here at KSC and do some integrated  
16 testing on it before it putting it up. Of course we've still got lots more components to go up. That  
17 process is still going on. I would like to see us go ahead and utilize the Station up to its full, I guess,  
18 capability that we'd originally envisioned which includes putting six people up there and that means  
19 you need some kind of a lifeboat that, I guess it's still being worked up in Washington right now and  
20 I'm not sure where it's gonna come down, but to really take advantage of what we should be doing  
21 from a science standpoint, in my opinion, requires more than the three-person crews that we can put  
22 up there now. There are lots of ways that might be worked, from long duration Orbiters up there

1 supporting it, to putting up more Russian Soyuzs up there so I'm not sure what the right answer is  
2 and I do know that's being worked extensively up there in Washington now.

3

4 Launius: Okay. What do you think of the folks who've led NASA over the years, NASA  
5 Headquarters, various other Centers, any particular comments on that?

6

7 Crippen: I think we've had some great leaders in NASA, both at the Headquarters level and at  
8 the centers. Usually the leaders turn out to be very strong personalities, that causes some problems  
9 sometimes but you can't ask for people that are more dedicated to the program than what we've  
10 had. So I'm just honored that I've had a chance to have an opportunity to know a great deal of them  
11 and a great many of them and had an opportunity to work with them.

12

13 Launius: You said early in the interview that there were some lessons you learned working  
14 Skylab that maybe didn't stay learned during ISS. Would you care to elaborate on that a little bit?

15

16 Crippen: Well, one of the lessons we learned was that the ground can overwork the crew easily.  
17 We particularly learned that on the last mission. The ground mission support crew had ended up  
18 working two flights prior learned along with the crew on orbit about how fast they could go and we  
19 got very efficient at making changes to their schedule and asking them to do this and that on a day.  
20 And then we put a brand new crew up there who hadn't been there and we were still up at the same  
21 speed that we'd been with the crew that just came down and we just overloaded that crew  
22 completely. I think there was a tendency to maybe do some of that stuff early on however the

1 experience that we got with Mir and putting some people up there helped us relearn those lessons  
2 before we started flying the integrated Station.

3

4 Launius: Okay. The relations with the Russians, I don't know how involved you've been but  
5 clearly there's been interchange between KSC and over there over the years with ISS and with  
6 other activities. Any particular issues or anecdotes that you'd like to relate relative to this  
7 international cooperative venture?

8

9 Crippen: I started back in Apollo-Soyuz working with them. . .

10

11 Launius: Okay.

12

13 Crippen: . . . and the nature of going from the Soviet Union to Russia in the post-cold war era  
14 was a pretty dramatic change. I found that cosmonauts are like pilots the world over, they could  
15 throw us together and we could interface and enjoy one another's company. There was, early on in  
16 the Apollo-Soyuz program I remember when the cosmonauts were visiting Houston, we did  
17 exchange visits, and one of their support astronauts, or support cosmonauts who was working in a  
18 role very similar to what I was doing, was named Vladimir Dzhanibekov. And I remember one night  
19 while we had a couple of glasses of appropriate liquid, that Dzhani gave me a toast that says, "Crip,  
20 may our guns never cross," which I'll always (never) forget. He ended up becoming one of their  
21 most experienced cosmonauts and of course left, is out of the program at this particular time. When  
22 we started moving toward the Space Station, making it more international, I can remember a

1 moment I was out at the Shuttle Landing Facility and seeing this, I forget what the Russian  
2 designator is, but it's their large airplane that's larger than our C5. . .

3

4 Launius: Okay.

5

6 Crippen: . . . it came in and landed there at the SLF for the first time, that was a remarkable  
7 moment for a guy that had grew up in the Cold War era. But again, those folks enjoy what they do,  
8 they do it very well and I've been extremely pleased at how well we have interfaced with one  
9 another and truthfully that, the challenge that I'd talked about on the Space Station when we were  
10 just trying to integrate components from the U.S., I thought was very tough, and the fact that we've  
11 been able to do it with the international components that are launched out of Russia is, I find,  
12 remarkable.

13

14 Launius: Yeah. I agree. There are lot's of young engineers, lot's of young astronauts that are  
15 following in your footsteps. If one of them were to come to you and ask you for words of advice and  
16 wisdom in terms of how they pursue their life and their careers, what would you tell them at this  
17 point?

18

19 Crippen: You know one of the neat things I had happen to me while I was still out at Thiokol  
20 was, we had one of the astronauts visiting out there and he says, "Crip, you may not remember, but  
21 I visited you when you were up in NASA Headquarters and I was an intern, or something like that,  
22 and I went to ask you how I could get into the astronaut program and you gave me some advice

1 about I would probably need a PhD at this particular point,” and he said, “I followed your advice and  
2 I’m an astronaut now.”

3

4 {Laughter}

5

6 Crippen: It was remarkable. But, well if somebody’s already in the astronaut office and selected  
7 I’ll probably tell them something they already know and that is, they ought to have fun. It’s one of  
8 the greatest jobs in the whole world and you’re not going to be there forever so take advantage of it  
9 and enjoy it. You’ve got a chance to contribute like you probably never will after that, but if you just  
10 look at it strictly as a job and don’t sit back and enjoy it you’re going to be very disappointed later on.

11

12 Launius: Okay. The future’s very bright in many ways. Where do you think, if you were to look  
13 back say fifty years from now, between now and then, what do you think we’ll see in space flight?  
14 Where are we headed? Any thoughts?

15

16 Crippen: Well, I know where we’re headed it’s just that I don’t know when we’re going to get  
17 there.

18

19 Launius: Okay.

20

21 Crippen: We’re going to continue to expand in space and we’re going to continue to do things  
22 like Station and learn how to exploit being in low earth orbit, but we’re going to go back to the moon.  
23 I’m firmly convinced of that, only this time to stay, and we’ll go on to Mars and I believe beyond that.

1 The question is what forcing function is going to cause us to do that and most of those kinds of  
2 exploratory operations require some kind of forcing function that's usually some way associated with  
3 financial or war and I don't know what it will be, but I'm convinced it'll happen, sooner or later.  
4 Probably not fast enough to satisfy me or most of the other people in the space program, but it  
5 eventually will happen.

6

7 Launius: Okay. Are there any final comments that you'd like to make on any particular subject,  
8 anything you'd like to say?

9

10 Crippen: Well, I sort of alluded to it earlier that if I could've forecast what I would have an  
11 opportunity to do back when I was first joined the Navy I would have said it would not been possible.  
12 I've had a very rewarding career, but it hasn't always looked like that when I stood at any particular  
13 time. It's like when MOL got cancelled, a low point in my life, when we lost that meteoroid shield off  
14 of Skylab, when we lost the Challenger. So, I usually tell people that it's always going to look  
15 brighter around the next corner if things are looking kind of dark today and for me personally that's  
16 certainly been the case.

17

18 Launius: Ok. Are there other questions that we need to get on the record at this point? Ok.

19

20 Crippen: I'm wide open. You've got me.

21

22 {Laughter}

23

1 {Faint background voices}

2

3 Patrick Moore: When you first were selected for STS-1 and you joined that program, that must  
4 have been a remarkable experience because certainly you had done your dues in other capacities,  
5 but you were selected for that. Can you express that a little bit from your vantage?

6

7 Crippen: Well, having an opportunity to fly the first Space Shuttle flight was kind of the ultimate  
8 as far as I was concerned for somebody that had trained to fly in space. I had, as I said earlier, six  
9 other buddies that had been on the MOL program with me and they had paid their dues as well, and  
10 it wasn't obvious to me they were going to put a rookie on the first flight from all the work that I had  
11 done. I supported the approach and landing tests in lots of ways, but I didn't actually fly on them  
12 except as a chase plane. And they were bringing, I think it was the Enterprise, which we used for  
13 ALT, through Houston one day at Ellington and I was out there walking around it with George Abbey  
14 who was, at that time, Director of Flight Crew Operations and George, in only the way George can  
15 do it, kind of mumbled a little bit here and there and he says, "Crip, how'd you like to fly the first flight  
16 of Columbia?" and I tell you, I could have done handsprings, probably did do some handsprings out  
17 there on the ramp at Ellington. It was a wonderful moment in my life.

18

19 Moore: What about the six other gentlemen that were in that program with you? Did any of  
20 them ever have that opportunity to follow in your footsteps, if you will?

21

22 Crippen: Oh, well, Dick Truly, on the second flight. He was the pilot on the second flight and I  
23 was his backup and he had been my backup on the first flight. In fact he tried to give me a free

1 skiing lesson or something like that, that I turned him down. (laughs) And then, the other guys all  
2 had an opportunity to go. Gordon Fullerton flew on the third flight. Did the only landing we've ever  
3 done at White Sands which everybody remembers and Hank Hartsfield flew STS-4 the first military  
4 mission we did with the Shuttle and that was the last of the test flights. We took out, or quit using  
5 the ejection seats after that and expanded it. Let's see. Overmyer did 5 I think, and Bob is gone  
6 now, lost in a private airplane accident, and then Bo Bobko got the next flight. So we had an  
7 opportunity, all in a string, I think that was Abbey's and John Young's plan as to how they would  
8 step rapidly up to getting other people trained to go fly in the commander's seat.

9

10 Moore: You referenced back to this a little later about this kind of transition when the Russians  
11 or Soviets were coming over here until the collapse and then certainly with the new opportunities  
12 that emerged. For the United States that period between the conclusion of the ASTP program and  
13 when you flew a lull in some ways where we were, as you mentioned, 1981 we had the oil crisis, the  
14 problem with the Iranians. You mentioned it a little bit, but this is an important moment for this  
15 country that you were undertaking, emotionally, how was it for you, that you were in some ways  
16 carrying the souls, the hearts of Americans but for the free world as well on your back?

17

18 Crippen: Well, I guess I didn't consider it that personal. I was part of a much larger team that  
19 was doing what I considered a very important job and, I think, maybe Al Shepard or somebody was  
20 credited with it first, but truthfully, as I was laying out on the launch pad getting ready to go fly, my  
21 thoughts were, "Crip, don't screw this up."

22

23 {Laughter}

1 Launius: All right. Okay. If. . .

2

3 {background voices}

4

5 Moore: . . . which may seem kind of odd, but a lot of people refer to this, especially when they  
6 designated the landing facility here as the primary landing site for the Shuttle, that there were some  
7 individuals in the Astronaut Corps who were less excited about that because of the logistics and the  
8 possibilities. Did you ever experience that, was that. . . ?

9

10 Crippen: Well, I guess I was in the middle of all that when, my friend John Young was I think,  
11 people believed as long as there was sand on the lake bed at Edwards, that's where we ought to be  
12 landing and John wanted the safest place to land the vehicle. Certainly the right place to go fly the  
13 first flight and the first test flights where you've got all that margin for error, but I was one of the  
14 ones, along with, I think, a majority of the program that believed that we could land down here at the  
15 Shuttle Landing Facility, that there was plenty of runway for that even though we like to say that they  
16 built the canal around the runway and filled it with alligators to give you an incentive to stay on the  
17 runway. That's a big runway, if you can't get it down there – the primary problem that you have to  
18 worry about is the weather. It does rapidly change down here at times with primarily afternoon  
19 thunderstorms and those sorts of things. I was actually supposed to do the first KSC landing on  
20 STS-7 and John Young, who was flying the weather, waved me off at the last minute and rightly so  
21 because at the landing time there was this nice big thunder bumper sitting right over the field and I  
22 ended out up at Edwards. I did get my last landing in here on 41G though. It all worked out just  
23 fine. And truthfully I'm proud of the fact that I like to feel that I helped in my role as Shuttle Director

1 do some things that allows us to get into Kennedy more frequently now, primarily with respect to  
2 putting a drag chute back on the vehicle, improving the brakes and tires considerably so that would  
3 not cause anybody any concern, and some of the things that we've done to improve our weather  
4 forecasting capability.

5

6 Moore: It may sound like an odd question, but there are very few people in the world who  
7 could possibly answer it, in contrast to the Orbiters, something that has that many parts and that  
8 many different elements to it, must have its own personality if you will. Did you find from your  
9 experience that there was a difference between them? Were there some that you enjoyed being in  
10 more than others? Obviously it was always a thrill, but. . .

11

12 Crippen: Well, truthfully, I only flew the Columbia and the Challenger. I flew the Columbia on  
13 my first mission and the Challenger on the three subsequent missions. The Columbia has a beefier  
14 aft thrust structure and it does give it a little bit different ride during ascent but other than that I really  
15 did not notice that much difference as far as the vehicles are concerned.

16

17 Moore: That first flight of STS-1 apparently from what the science reports are that the  
18 expectations of the performance for the SRBs was far more than anybody anticipated and things  
19 turned out. Speak a little bit to that being the person who was on board there.

20

21 Crippen: Well it was both the solid rocket's performance but it was mostly the aerodynamics of  
22 the wings onboard the Shuttle. We ended up getting a lot more lift than had been forecast by the  
23 simulations. The first stage of the Shuttle is flown in an open loop mode as far as guidance is

1 concerned. It's not trying to reach a specific point, it's just for each velocity I want this kind of an  
2 attitude and as a result when John and I looked at our displays it was obvious that we were going  
3 high and higher was better than going low as far as I was concerned, but it was not that dramatic  
4 and we did expect to find some new things aerodynamically about the vehicle. When John did that  
5 first landing, we floated for much further, in the flare than what everybody had forecast because we  
6 had a lot more lift there than what they had forecast. So those kinds of things were why you go do  
7 test flights and why you want to land on a lake bed the first time.

8

9 Moore: That makes sense. A question which I've had a wonderful opportunity to speak with a  
10 lot of people about the Challenger experience over the last ten weeks and the way that it not only  
11 challenged us but made our program better in the process and for you who was brought to this  
12 program, brought back to Kennedy to help facilitate the investigation. Tell me about that, for  
13 somebody who was a key player in this, an astronaut yourself, and obviously very in tune with these  
14 people, how was facilitating that process from the inside?

15

16 Crippen: Well. . . it was probably one of the tougher jobs that I've ever undertaken, because  
17 emotionally I was involved from the standpoint of a great loss. Those were very close friends [that]  
18 were lost aboard the Challenger. I was emotionally involved in that I really wanted this vehicle back  
19 flying and flying safely and trying to ascertain exactly what caused the accident was extremely  
20 important so I wanted to make sure we didn't track the wrong clue and come to the wrong  
21 conclusion. After we'd moved past that and we were in the era of trying to put the vehicle back  
22 flying together it was important to me that we have a management structure that didn't impede  
23 communication. That if there was a problem out there, that we heard about it and dealt with it

1 appropriately. And trying to overcome the fact that people probably were going to be frightened to  
2 go fly again and. . . getting the vehicle back flying again and flying safely was really important to me  
3 and probably, as I look back over my career, that's the thing that I find the most rewarding, that we  
4 did get it back and we did get it back flying safely. But there were a lot of folks that anytime the least  
5 little thing people were going to say, "Ok. Let's stay on the ground." And you've got to get past that  
6 point. Flying in space is naturally risky and you've got to weigh that risk with what you're dealing  
7 with. When you've got a problem you've got to try to understand it, but you can't study it ad infinitum  
8 or you'll never go fly so it was an interesting point in my career but one that in retrospect I'm glad I  
9 had an opportunity to play a role in it.

10

11 Moore: Well and a learning curve for the entire nation and I think as you mentioned it was  
12 obviously very painful for you, but for this country, unlike the Apollo 1 fire where we learned about it  
13 after the fact, this was something that we witnessed on our televisions across the country.

14

15 Crippen: Right.

16

17 Moore: Immediately after that, as you discussed, we were in a transition. It probably couldn't  
18 have come at a more inopportune time in terms of administration, but from the Kennedy perspective  
19 we suddenly were flooded with thousands of press people who were down here searching for  
20 answers to what happened and at the same time the Kennedy public affairs people were doing  
21 everything they could to facilitate that process but there was this constant waiting game. Did that  
22 ever come in, that you were kind of the go between and the whole world waiting to find out what  
23 happened?

1 Crippen: I was probably one of the stumbling blocks being in management at that time. That  
2 was a unique period and also I learned a few lessons out of it. We had a press corp that knew the  
3 space program very well, but following Challenger we had a lot of people that knew nothing about  
4 the space program that came in and it seemed to me from where I sat that their primary goal was to  
5 try to go find somebody to hang or something of that nature. In the investigative side we wanted to  
6 find what the problem was and in the media side they wanted to know ever little thing as it was  
7 going on and I was resistant, along with other management, to give out facts until we knew what we  
8 were dealing with. I learned as I moved through it that you need to find a balance. It was such an  
9 important event that the media needed to be kept up-to-date. They needed to know what you were  
10 doing, but I don't think you ought to try to give them data that misleads them so it's the way in which  
11 you do it. And after having gone through all that I've learned, it's like I talked about with you people,  
12 you need to be honest with them, sit down and talk to them about what's going on, make sure they  
13 understand if you've got one clue that you can't jump to a conclusion about what that clue means  
14 until you've put the whole piece of the puzzle together. But that was a tough time dealing with the  
15 media at that particular juncture.

16  
17 Moore: When you were talking about this growing curve, this development stage that you went  
18 through and what you learned from that, during your tenure as Center Director working with the  
19 public affairs capacity, did you find that there were lessons learned, if you will, from that experience  
20 which enabled you to communicate, to work with the press and the general public to an easier  
21 extent, to a greater extent? Did it change your views?

22

1 Crippen: I'm not sure I tracked your question exactly. As I dealt with the media early on when I  
2 was first introduced to NASA, but I would say it was more of a friendly media, probably is the best  
3 way, and it was starting with the Challenger accident I learned that the media's not always friendly  
4 and so it did educate me there and when I went on to Washington as the Director of the Program  
5 and coming back to KSC I better understood a little bit about how you needed to be in front of them,  
6 you need to, and we did set up venues where I could meet the press a little bit more often than I  
7 probably would've liked to do but I knew that was the right thing to do.

8

9 Launius: All right. Wonderful. Thank you so much. We appreciate your taking the time to be  
10 with us today.

11

12 Crippen: Oh, it was painless. Always happy to come back to Cocoa Beach.