

NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT

ORAL HISTORY 2 TRANSCRIPT

CHARLES L. DUMIS
INTERVIEWED BY KEVIN M. RUSNAK
HOUSTON, TEXAS – 4 APRIL 2002

RUSNAK: Today is April 4, 2002. This interview with Charlie Dumis is being conducted in Houston, Texas, for the Johnson Space Center Oral History Project. The interviewer is Kevin Rusnak, assisted by Sandra Johnson.

Thank you once again for coming out to do another interview with us.

DUMIS: You're welcome.

RUSNAK: I'd like to start with actually building on something you had mentioned last time. You said that the period between the end of the Apollo-Soyuz Test Project and Space Shuttle was kind of a dead period for Flight Operations. I was wondering if you could elaborate on the things going on in that period of time—how you were preparing for Shuttle or these other kinds of activities, perhaps any participation in the Approach and Landing Tests [ALT] if you had anything to do with that.

DUMIS: Early on, I mean, we didn't have much that we could use to go on, as far as preparation. It was fairly early. Gee, I mean, there's not any real—it may come back to me—but there's not a whole lot of recollection. As the data become available, then we began to work on the Shuttle. We actually started training, or doing the formal Shuttle training, the simulations and all, it seemed like it may have been up to two years before the actual flight. That number may not be precise, but somewhere in that vicinity. It's at least the number thrown around by some of the later guys about how long we trained on that flight.

But, we did that, and typical preparation, of course, you had to go through, and as you got information, we prepared our operations schematics that we do as a system reference volume for the Shuttle, and that also served as kind of a training tool, because as you dig through that stuff, you learn how the thing operates, or at least you get a lot of information on it, and procedures, and mission rules, all the ops [operations] products, we did that.

Maybe you could be a little more specific about what you're asking for and maybe—but basically it was that. Now, as I say, I don't really recollect what we did until we began to get that information, but it was a pretty tough period and we actually had to downsize a little bit. We lost a few people, not a whole lot. In ECLSS [environmental control and life support system], we did pretty good at keeping most of the people we had. We had some pretty good guys.

RUSNAK: Did you feel any impact of the budget reductions or the reduction in force [RIF] other than, as you mentioned, just these few people that you lost?

DUMIS: Not personally I didn't. Well, it seemed like there was a period of time it was a little harder for people to get promoted at the time. But, I mean, it seemed like it was a little slower then than maybe during Apollo and then later on. Like I say, we managed to do—in our particular area, we did fairly well. Obviously, they needed to keep experienced people and just fly the Shuttle, but there was a period of time where it was pretty tough there.

RUSNAK: In terms of the experienced people, what interest was there from the men who had worked the Apollo Program on staying around in the same sort of positions for Space Shuttle?

DUMIS: I guess everybody was eager to accept new opportunities and that sort of thing, so I don't think that there was any specific interest in explicitly sticking around for the Shuttle. They certainly wanted to work on Shuttle, but if there was something that offered them other

opportunity, I think most people would be willing to do that if they felt like it was an opportunity.

But, once again, of course, even that, at least in JSC, it seemed like that was because of the budget thing. It seemed like that was not as plentiful as it might have been at another time also. But there were people like John [W.] Aaron, he went off and did other things and some of the other people did. So I would say that the experienced people, for the most part, actually did stay there. I guess the ones who liked doing the work did stay there. Sometimes it might be that if the opportunity didn't come to them, they didn't necessarily seek it, and I don't know whether that was the case or not. Like I say, most of them stayed there. I don't know of a whole lot of them that were actively looking to go work somewhere else at the time. So I guess in that regard they perhaps were interested in staying there.

RUSNAK: So you ended up with kind of a mix of rookie flight controllers and then some of these veterans?

DUMIS: There weren't so many rookies because they didn't do much hiring, at that time, either. There were some different people, but there was periodic reshuffling of people to some degree—not all. I mean, sometimes the function ended. For example, during the Apollo Program, we had the LM [lunar module] Systems Branch and a CSM [command and service module] Systems Branch, and I think a lot of those LM folks went off and did other things, but some of those guys came over in our world because the people primarily worked just CSM, and then the Skylab inherited the Shuttle, and some of those guys wound up in our world. And there were other people there also. Occasionally, we did have some co-ops [co-operative education students] that worked there at times. I don't remember any of those actually hiring on with us at that time, though, but typically had a lot of the guys, as I said, worked at Skylab, if not Apollo. A lot of those guys [unclear] follow-through.

We had several people that were there, that came on for Skylab and didn't necessarily work Apollo. But it was a pretty good mixture, pretty good continuum of experienced people. And there were a couple of people who came on toward the end of the Apollo Program. And I don't remember any rookies until later in the Shuttle Program.

RUSNAK: Did you find that was the case with the other areas as well, like when you're in the Mission Control Center for these first few Shuttle flights, are they all familiar faces in the control room with you?

DUMIS: By and large, I'd say most of them were. But I'd almost have to go through a printed manning list to remember who was there precisely, but for the most part, they were. I think that some of the other areas lost a little more people than we did, and they probably replaced some of those guys but it seemed like, at least the first Shuttle flight, there was pretty much mostly the people who'd been around a while. Well, I worked in the environmental world. Where I worked, I worked Shuttle flights one and three. I was support at two and I was the section head at the time and somebody else did that. And then about 1983, I left that group. But during that timeframe, pretty much experienced people.

RUSNAK: One of the comments we've heard from both flight controllers and outside was that during the Gemini and Apollo Programs, all the flight controllers were very young. You think about the amount of responsibility these young men were handed. If you have a lot of these same people going to Space Shuttle and here you are maybe fifteen, twenty years later after some of these early programs, did you find that there was a sort of different dynamic in the room than there had been for previous programs?

DUMIS: Well, I didn't notice the dynamic being so different at that particular time. I think it might be different now. It seemed like the young people were—I mean, they were quite capable. I have thought back at times about like some of the things we did, and I may have mentioned this last time, is that given the way we conduct at least the Station I work on now, it seems like we are extremely cautious about things. For example, on Apollo 12, we were struck by lightning and we brought the systems back up, looked it over, and went on and landed on the Moon. Now, it might happen today, but seemed like it would be a little—well it seemed like, with the caution we use now, that you might not have done that. So I think the dynamic is considerably different now, but up through the early part of the Shuttle, it seemed like it was pretty much the same.

Actually, I guess probably about '83 I kind of moved a little bit away from the Shuttle, and I went over and worked in the Space Station for a little while. Then I changed jobs and went to work for Rockwell, and I worked back on the Shuttle Program for a while doing launch commit criteria, and then I went in and worked in the Mission Evaluation Room [MER] as the subsystem person for ECLSS. It seemed like it was pretty much the same.

Actually, the Shuttle—I've been out of that for about four to five, almost five years now, and even up to that point, it seemed like you didn't notice a radical change in dynamic, but sometimes changes are slow enough that you don't notice them if you're watching the—just like you may not be aware your child is growing as much as they are if you see them every day. You might be if you saw them, you know, a year apart, if you saw them one time and then a year later you saw them again. So I mean the change is kind of like that. But I didn't notice any real significant change in dynamic up to that point, even with the younger people in there.

RUSNAK: What about physical changes in the control center, new technology or computers that may have changed the way you did your job and the things you're looking at?

DUMIS: We didn't really do that much change until—I think the big change probably happened about less than ten years ago. I mean, we were still basically tied to the old mainframe computers and we did the first part of the Shuttle that way. In fact, I think I was in the Mission Evaluation Room in the Shuttle ECLSS when they switched over to these local area network systems they've got now, or actually it may have been even later than that, but it was sometime during that timeframe when we moved over, I guess when we moved over to Building 30 South.

But that was where you noticed a broad change. I think now in looking at least like what some of those Station people do that do the job that I did like for Skylab and Shuttle, I'm not sure I could do that anymore, because the tools they use are different and I'm not familiar with them. I could probably learn if I had I long enough, but it's just a different dynamic, like you say. But I think that was the big change.

Now, we did begin the use of—once laptops—not laptops, but PCs [personal computers] became available, you began to use those things quite a bit, and I guess that would have been about 1983 or '84 or '85, somewhere in that timeframe. We started using them and having them readily available. Maybe not quite that soon, but that was kind of after I was out of the mission operations side of the thing. Once we started using that, it certainly helped things.

RUSNAK: With the first Shuttle flight, I think you had said last time that you worked the ascent phase of that.

DUMIS: Yes.

RUSNAK: What can you tell me that you remember from this first mission?

DUMIS: I remember we simmed [simulated] it for like, I said, a couple of years almost. Well, we had quite a few areas of responsibility, our discipline did, and no matter how hard they try, they

just don't have enough money to simulate the way that our—we can only guess how the environmental systems are going to really perform. And even if they could even guess the dynamic, it would be expensive to simulate. So they don't really ever do a very good job at doing that. They put something up. But we learn, in the first, like, four or five hours of the flight, more than we had learned in the last—about how the thing really operates—than we learned in the last four or five years.

Neil [B.] Hutchinson was the flight director on our team. I remember—I may have mentioned this, I think I told you this last time. Well, maybe I didn't. But we were the environmental or the ECLSS guy. I guess we called ourselves EECOM [Electrical, Environmental, Consumables, and Mechanical Systems] at the time. That was the traditional call at this time.

We had very few reasons we would ever abort, and they are pretty complicated to do that, and on the Shuttle there are three avionics bays that each have two avionics bay fans. Our division chief, he edicted that we would abort if we lost two of those during ascent. I don't know, I don't think I was all that keen about that rule in the first place. But we only had one measurement to determine their performance, and that just doesn't look like a good thing to do. But one day during a sim, we were running the launch abort sim, which you launch and go up and usually you abort. And once you land or at least get at some point, you terminate the mission, or terminate the sim, which is about maybe fifteen or twenty minutes, and you debrief it and then you start over.

Well, one day we were simming and one of the fans went down, and then there was some kind of degraded performance on the other one. It was one of those cases where—is it or isn't it? Of course, I reported this to the flight director and then he called an abort, and it looked like the performance improved a little bit. I told him that and he said, "Oh, Charlie, don't tell me that. I just aborted."

And I said, "You didn't abort for me, did you?"

And he said, “Yes, I did. Yes, sir, I did.” Something to that effect. That was Neil. So that was my big chance to call an abort and I blew it. I think it’s the only chance I ever got.

RUSNAK: Oh really.

DUMIS: Yes. But the mission itself is relatively short. It doesn’t seem like on the first mission there was all that—I mean, there were probably a lot of small things, because usually there are. There’s things that are unexplained, or not explained, or unexpected, let’s put it that way, that you’ve got to go figure out why it happened. But there wasn’t anything major that happened in our systems.

RUSNAK: I think one of the APUs [auxiliary power units] had a malfunction near the end of the flight.

DUMIS: It may have. I don’t specifically recollect that. And I’d like to go back and refresh myself on it, but I don’t remember it right now. I’m certainly not saying it didn’t.

RUSNAK: Last time you had mentioned that for at least these couple of Shuttle flights that you did work, it was in some ways very similar to Apollo in that each mission was kind of its own entity. There wasn’t this big change. Did you feel that way after you had flown these that that wasn’t much different than these other flights you had done?

DUMIS: When I say it wasn’t different, it was certainly more complicated than Apollo. We had a lot more systems and a lot broader area of responsibility. Typically, as the things get bigger, they get more complex or at least there’s more there. For example, I think we had two coolant loops in Apollo, and one of them we only operated, I think, during entry. It was a backup when

it wasn't a full loop. For example, on the Shuttle, we have two freon loops and two water loops, so two freon loops operated all the time and one water loop, so that kind of complexity.

We had a [unclear] compressor that basically did the air circulation, but we had cabin fans and avionics bay fans and stuff like that, so the items multiplied. I guess I think what I meant was that your preparation was similar in that you had a finite starting time and a relatively short time later, a couple of weeks or less, usually, it ended.

So the package—basically, although you didn't come out on parachutes, the landing had an entry phase and a launch phase, and in that regard, a lot of similarity, at least in theory. So, yes, I think they were similar that way, but they were certainly more complex. I think it's still basically the same. Even when I was working in the Mission Evaluation Room, it's basically that. In fact, in working in the Station, we typically do a daily monitoring of a single shift, even sometimes less than a shift, on weekdays, but when we have a Shuttle launch, we staff up full-time around the clock so it's almost kind of the same way for us in that regard, for Station, although we have continuous work all the time. So, to me, it seems fairly similar. I'm sure there are other differences in other disciplines, though.

RUSNAK: With regards to the added complexity of the vehicles in some of these different systems, how did the reshuffling of responsibility for these systems work from Apollo or Skylab to Shuttle? I think you gained some new systems, some split off, and later on you'd even mentioned that some of the further ones split off into new positions in the control center. How did that negotiation work?

DUMIS: As I said, during Apollo it became obvious that your communications was not unique to an individual vehicle, and if you had more than one vehicle up there, your communications need to be managed by a single person, so they split off the INCO [Instrumentation and Communications] function.

As Shuttle came along—I mean, I'm not real sure exactly. I think what happened was, we started off as EECOMs, and that included the fuel cells and the electrical power distribution system and all the ECLSS stuff, including the thermal, passive and active, the cryogenic storage system—or actually this one is called—it was where you stored the liquid oxygen and the hydrogen for fuel cells. I don't remember what the acronym was. But it included the hydraulic system, the APUs, and the mechanisms, like the payload bay door and the bent doors and the landing gear and the aero-surface controls and all the systems that operate those.

So it was a pretty broad area of responsibility, and I think that the way we were divided up administratively was we had a Mechanical Section and an Electrical Section and an Environmental Section. That was all within that particular branch, and I think there were at least two systems branches. I think the communications system was also in that branch. And then the propulsion and GNC [guidance, navigation, and control] and the data processing system, they were all in another branch.

But administratively, we had all those systems, and we started out, at least except for the communications, as a single entity. I think the electrical power guys arrived at a conclusion that there was too much stuff there, for one, so they asked to create a new discipline and they were granted it.

The split probably wasn't exactly equal in that regard because the electrical power system and the fuel cells did not constitute half of all the activity, and eventually they split off the mechanical systems into another discipline, but during the first part of the Shuttle Program, the mechanical and the ECLSS were together.

I think it was kind of just something that was kind of obvious and we might have been able to split the mechanism off sooner had we thought of it, although in the old control center you only had a certain number of positions, so that may have presented a problem in itself. I guess basically we were operating from the Skylab setup and there was, at that particular time, the—how did we do that?

No, I guess we had an ECOM for the command and service module and an EGIL [electrical, general instrumentation, and lighting] for the Skylab, but we had kind of the idea of two positions. I don't know exactly how they wound up getting two actual positions in the control center, but we did do that, side by side. And I think it was just something relative. I think it was pretty easy to demonstrate that we had a pretty heavy load there. I don't think it was that difficult to sell. As I say, it might have been a good idea to split it a little differently, but that's the way it wound up.

RUSNAK: You had mentioned that STS-3 was the last flight you had worked.

DUMIS: The last flight I worked was in the ECLSS systems officer. I did do some work in the SPAN [Spacecraft Analysis Room] on other flights, and then, of course, later on in the Mission Evaluation Room.

RUSNAK: How was it working in the SPAN room as compared to the front room?

DUMIS: Oh, I enjoyed working in the front rooms okay. It was not something that was as much fun, but it was still interesting. I mean, you had to do a different task. I only did that—probably—I don't know, probably, maybe five or six flights, maybe a few more than that. I guess I was off most of the time working Space Station stuff.

The SPAN was basically coordinating activities. It was kind of the interface between the Mission Evaluation Room and the flight control guys, and just a little coordination, particularly with them and sometimes maybe even between disciplines outside the front room.

The activity level wasn't quite as great. I can't say that. I mean it was enjoyable enough. I still like working—I probably still would like doing it. The front room operation, I always kind of enjoyed that, except Skylab did get a little long.

RUSNAK: Were you just looking at the ECLSS systems from the SPAN room?

DUMIS: No, no. You had, I think, pretty much all the Shuttle systems. There was somebody there for payloads and there were two or three other people, but I think our particular position was the interface for all that.

RUSNAK: Do you remember any major anomalies during the time that you were in there?

DUMIS: Honestly, I don't have a very good recollection of that particular time. I can't even tell you for sure what flights I worked back there. I didn't make a record of them, but it was somewhere like I think after nine, but well before the Challenger accident. I'm sorry, I do not remember.

RUSNAK: I know STS-9, one of the APUs caught fire actually during reentry and landing.

DUMIS: Yes.

RUSNAK: I don't know if that was something that you had come across.

DUMIS: No, I don't remember that now, or at least if I thought about it, I might, but it's not something that sticks in my mind. I don't know whether I worked that mission or not. I'd have to go back and look at my calendar and see just exactly when all this broke, but I don't specifically remember that. When did STS-9 fly?

RUSNAK: I think that was September of 1983 or right around that point.

DUMIS: It probably would have been about the time I moved off somewhere else. I might have been in the SPAN room. I just don't really recollect that. I'm sorry, but I don't.

RUSNAK: That's okay. Why did you move into Space Station activities when you had been working in this area for so long?

DUMIS: I was asked to.

RUSNAK: Could you elaborate on who asked you and maybe why, and then what was going on at that time that you were becoming involved with?

DUMIS: Actually, I say I was asked to; I was directed to more than anything else. I couldn't even really begin to say what was led to that. The activity was a new activity going on, and so I did it because basically I was not given a choice about it.

RUSNAK: Do you remember what the timeframe was?

DUMIS: It was in '83. I don't remember—it seemed like it was in early '83 because I think it was in springtime, spring or early summer, that's my recollection of it.

RUSNAK: What kind of status was there on Space Station?

DUMIS: There was very little going on. It was very early in the program. The mission operation director who was working that was Dick [Richard A.] Thorson. Hal [Harold A.] Loden, I believe, was over there and Sy [Seymour A.] Liebergot, and seems like there was another name,

but it doesn't immediately come to mind. Basically, it was just kind of make sure the MOD [Mission Operations Directorate] interests were—to contribute whatever MOD insights might offer to the program, and I guess that's basically it, just kind of follow whatever was happening in the early phase.

Later on, they set up an off-site office over in the building at the corner of Buccaneer and Gemini, and I think it's Gemini—whatever building that is anyway. They sent the Space Station guys over there to develop a plan for that activity, and basically I remember that they set a budget and we came in with a plan that was about twice that. And Neil Hutchinson was, again, kind of the head of that activity. I think all the guys in Thorson's office went over and worked that. I don't remember how long that lasted. It was several months at least.

After that was over, MOD formed an office, a DA [mail code for the Assistant for Space Station] office, basically that's just an offshoot of the director's office, a small office to follow Space Station, and basically it was Chuck [Charles R.] Lewis and—let's see, who else was in there. Jerry [Gerald L.] Shinkle and Ray [B.] Lachney and Dan [Daniel T.] Sedej. We basically followed the Space Station activities for MOD.

I, in particular—we had some activities that—basically they budgeted some funds for different activities you need to do in planning preparation for Space Station. I think I got to kind of track those and sort of administer those, some of those, during that time.

In '87, of course, once again, there would be periods of activity and then there would be some quiet periods. But in '87, I retired from NASA and went to work for Rockwell [International]. That period extended up to '87, actually the beginning of '87, the end of '86.

RUSNAK: I'd be interested to hear more about this very early period on Space Station, what they called the skunk works.

DUMIS: Well, basically, they just threw a whole bunch of guys into this room, and it seemed like there were quite a few PCs there. Basically, you'd go off and try to establish—well, I think it is always the nature in any program like that, your experience tells you this is what you really ought to do, or maybe it would be what you'd really like to do. And we put all that down on paper. Of course, I guess basically there would be some give and take. These were done kind of in discussion format and there would be some give and take, and try to meld together a compatible set of requirements. In other words, sometimes they didn't all necessarily mesh. Sometimes one person's requirement might seem to contradict another's. But try to come up with a framework that you could work with and, hopefully, was within budget.

Typically, though, when we discussed a lot about robustness, which basically meant that you wanted to have an ample system that the thing could operate alone, and if you had some failure, you could survive until you could have time to repair the stuff. That was a term that was thrown around a lot.

But in any event, you basically come down to, I guess, basically a set of requirements or general requirements about what they think should look like. Seems like that's where they come up with the concept of nodes and like Tinker Toy-type arrangement, which was probably a fairly good way of doing it, given the limit of what you can haul up there at one time. That's kind of my recollection of it, unless you've got something specific you might want to ask.

RUSNAK: What kind of direction did you have, either from Headquarters or from the Program Office, in terms of what the final product of these few months, or whatever, should be?

DUMIS: Well, obviously it had to accommodate certain activities. We were going to go up there to do some kind of scientific work, so I think you had microgravity-type research. That's one thing you'd benefit from space.

What are the others? I would assume they would have wanted to accommodate Earth-viewing, maybe some astronomical stuff also, but I really—golly, I'm sorry, but I'd have to go back and refresh—but include those as capabilities for those things and, beyond that, you had to provide life support, I mean people support. I don't remember how many people were targeting for then, but it had to be for a certain number of people and, of course, it obviously had to stay up there by itself and it had to have enough capability that a single significant failure wouldn't wipe them out. So, basically, of course, that's kind of obvious, I think. Sorry, this is as far as I can go on it.

RUSNAK: You just said earlier that you kept coming up with these numbers that were essentially twice what the budget they were thinking was.

DUMIS: I think our final product was almost double what they estimated the thing. It seems like they were talking about eight billion or it seems like nineteen—it might have been nine billion, but the ratio was something like that. Those numbers may be just off, but I think they're in the ballpark. It was basically worked out that way. It's hard to do that stuff.

Of course, they have some kind of multiplier that they use for this to determine costs, and that's the way the multiplier worked based on the capability you were saying you need. That was the product of the thing that I recollect. I know they may have gone back and scrubbed that effort.

Anything further?

RUSNAK: We just heard a lot of comments from people like John Aaron about how this eight-billion-dollar Space Station figure kept hanging over their heads, and the Space Station everybody wanted didn't really want to fit within that sort of budget, so I was just wondering

how someone who was working on the practical end of this, how that kind of trickled down to your level.

DUMIS: Well, I mean, we were all conscious of it. I guess you go back to the old expression, “You can’t make a silk purse out of a sow’s ear.” Sometimes, if you’re going to provide this capability, you can’t do it for—well, you can’t go down and buy a Rolls Royce for the price you could pay and buy a Chevy for, or something like that. That analogy is probably inappropriate but, basically, if you want the capability, your budget target is a little bit low.

Whether or not we could have built something for that, I suppose we could have. I don’t know what we’d had to give up, but that was the target they were going for. And it was certainly over everybody’s head. Like I said, I certainly don’t recollect what they did after they came out with this larger figure.

I think I got transferred out of that particular area, over in Chuck Lewis’s area, or sometime about then. So I may have went away from that before they began to do the scrubbing, but I don’t remember exactly what happened after that, whether they increased it or whether they just went with a number, I’m sure they tried to scrub it down some, though. But, yes, that was a hammer that they used. They wanted it for that price.

RUSNAK: During this period, did you have any interaction with the folks over at Marshall [Space Flight Center, Huntsville, Alabama], who were also trying to come up with their own design for the Space Station?

DUMIS: When they started the skunk works, they brought people in. I don’t remember whether the people come from Marshall. I know the people from KSC [Kennedy Space Center, Florida] came up here and worked in it. I don’t specifically remember people from Marshall, but that doesn’t mean they weren’t there. It may be another thing where I just don’t remember. Marshall

I don't remember, but they may have been there. And I wasn't real familiar at that time what Marshall was doing. I'm sorry.

RUSNAK: After this initial period, NASA basically decided on a configuration for the Space Station and split it up amongst the centers as work packages. I was wondering what your thoughts were on that division, who they went to, and how effective or ineffective that was.

DUMIS: Well, the thing that I remember specifically, of course, the thing that you kind of key on is the stuff you're familiar with. I was familiar with the environmental systems, and somewhat the electrical systems, but particularly environmental systems. Originally, JSC had the environmental system package for the Space Station, as the management for it.

Basically, the initial division of it—I'm trying to remember how this actually went. There was more allocated to Marshall than was allocated to JSC, and, of course, I wasn't really privy to all this. This was pretty high-level stuff. But this was the way it appeared to go, and from the stories I heard, apparently it did go that somehow or other they took it up with their congressional delegation, and the congressional delegation raised Cain about it. I don't remember exactly the sequence, actually, but at some point there was still a complaint going around, and I think it was Administrator [James M.] Beggs, I believe it was at the time, he switched them, just switched them. And so then Marshall got the ECLSS work. Like I say, that's the part I remember.

I guess they did a pretty good job on it. I don't really have any quarrel with them. They did do the Skylab, but, of course, I think that a lot of the Skylab hardware is a derivative of Apollo, if not actual Apollo hardware. They are certainly capable. I wouldn't even begin to suggest they weren't. I think the one thing that they might have missed is some of the background that the people here had in the ECLSS world. But, beyond that, I was disappointed, but they did a good job on it.

What I'm getting at is some of the experience—sometimes you learn stuff that—it's just little things, it almost becomes intuitive after a while and then you just wouldn't do things a certain way, and it seems like we're forever going back and reinventing stuff like that. I think I've seen some of that—some of that—not a whole lot, but basically they didn't have the benefit of that, but that doesn't mean they weren't experienced. It's just that JSC has a little more experience, I think, in that regard, but that's just that one system. But like I say, I think they did a good job. It works pretty well, as good as the budget constraints allow it to work.

RUSNAK: How did they do in terms of an operator's standpoint, as someone who has worked in flight operations for so long?

DUMIS: Marshall?

RUSNAK: Yes.

DUMIS: Actually, the MOD operates the Space Station.

RUSNAK: I guess in terms of considering operational constraints in designing the system.

DUMIS: Well, I would not criticize on how they did it. In my familiarity with the Space Station, there are a lot of snags in it. But, on the other hand, you start building stuff and then they change the ground rules a few times, and you can't necessarily go back and redo the stuff you've already built. Sometimes you encounter where you have to make do with stuff that might not be absolutely optimum for the new condition. I don't have any specific instances. I'm just saying that sometimes that does happen. I think that they cut out a lot of testing because of budget considerations—not Marshall—but just the agency.

We've encountered some problems, I think on the Space Station, that we might have found out on the ground instead of up there if we'd done a little more testing. But that's just simply a matter of, you do what you can do. It has no bearing on who did it. I don't even see in operating a Space Station, during Skylab there was quite a bit of conflict. Maybe not just conflict, but issues between Marshall and mission operations. I think it's a difference in cultures, but I don't even see that that much now. It seems like it's going relatively smooth, given the circumstances.

Skylab, we had a bunch of problems the first Skylab mission, and then it leveled out. It got kind of dull after that, and I think Station's kind of doing the same, it seems like. Of course, it may be early to say it's leveling, but we've certainly have had a few problems up front, at least in our world, the ECLSS world.

RUSNAK: And they still have some building to do.

DUMIS: Yes. Of course, I guess in our particular world, a lot of the building is going to use a lot of the same equipment, like the Japanese modules or something get up there. I think the original question was, operation-wise, I don't know how I'd speak for the operation guys. Our particular end of it seems to be working. It works—I wouldn't call it smooth, but it's smoother than it started out and I think it gets better as time goes on and it probably will always could stand some improvement. But I think we're doing reasonably well, and we're interfacing with Marshall reasonably well, or the Boeing people in Huntsville, primarily who did this stuff.

RUSNAK: How did your job change when you went to work under Chuck Lewis?

DUMIS: From what?

RUSNAK: From what you had been doing on Space Station.

DUMIS: Well, it's kind of a continuation of the same thing. It's just a different office. I mean, it was different from the skunk works, but basically, as far as the MOD part of the thing goes, it was basically more of the same. As things moved on, as you got closer to having something more finite to deal with, and I'm not saying—leave off the term physical, because it was a while yet to get anything physical—but you had something a little more specific you were dealing with, a little better defined. You had specific things you could address, but basically it was kind of a continuation of that, but a little better defined. And we did have some budget to go work specific issues, and we worked those issues. The issues weren't as specific, they were more general and perhaps a little vaguer earlier. I guess that's the biggest change. It wasn't a radical change at all.

RUSNAK: Do you recall what some of the specific budget issues that you were having to work through were at that time?

DUMIS: I think the biggest one was operations costs. They were always trying to get your operations costs down. There was always kind of a tradeoff between having somebody on the ground supporting the thing versus building in capability on the vehicle itself to do some of the stuff that the people on the ground do. Then on top of everything, there was, of course, I think in MOD there is kind of a traditional way of doing things, and I guess there was some desire—I mean, they felt like there was a right way to do things, and they would want to continue to do in pretty much a similar way.

It seemed to me—I mean, my experience on Skylab was that I really got tired of working Skylab, not the physical work, but just being there. Basically, you worked a week on days, a week on evenings, and a week on nights, over and over again, and you were in that room all day

long. I just kind of wanted to get out and see the sunlight sometimes, if nothing else. That was the feeling I had. I was glad when Skylab was over. I always felt like that Station was going to be about twenty orders of magnitude—well, not twenty orders of magnitude, but twenty times as bad, because it was supposed to go twenty years. And they're doing it right now, and I think they're experiencing a fairly significant attrition rate, just because people kind of get tired of doing that. I'm not sure that I have a solution for that. I'm not even offering one, although I kind of wish that they would consider—and once again, it's a tradeoff.

The people who you want to know what they're doing and be familiar with the systems that are operating on the spacecraft have to have a constant refreshment on that, otherwise they lose their edge. You have to look at these things periodically to see what it's doing, to kind of understand the next time you see it if it's doing something different. And like I say, if you don't do that fairly frequently, maybe even on a daily basis, or at least certainly—well, I think you'd almost have to do it on a daily basis, but you could have breaks or at least every other day or something like it. But you've basically got to keep some kind of continuity in there.

I don't know that you have to do it twenty-four hours a day, but you need to do some of that to maintain your familiarity with it. So you either do that and have people there all the time, or you have some kind of way that they can spend some of the time of the day looking at it and release them. Obviously, you need to have somebody there all the time, like somebody to make ground decisions and somebody to manage controls so that they've got a communication system. But once again, part of that is how much capability are you building onboard.

One of the downsides of the Station is, I think they anticipated to have continuous satellite coverage of the Station, or maybe it didn't matter. For example, on the Shuttle, whenever the Shuttle goes LOS [loss of signal], they've got a recorder that records data. It may not record all of it. Had the same thing on Apollo. But it records enough data you can kind of tell what happened during the LOS and then when they would become AOS [acquisition of signal]—I guess you're familiar with those acronyms.

RUSNAK: Yes.

DUMIS: They can dump that data. If something happened that you want to look at, you can go back and retrieve the data—it's stored—and examine in detail what happened then. The Station does not do that. I mean, it's just whatever coverage you've got is it. Something happens during an LOS period—and even though they have satellites that would pretty well cover you all, but I think they never did get the third satellite up there, so that there's a little gap over the western Indian Ocean or somewhere out around over there. But even though they could cover it all the time except that, sometimes somebody else gets the coverage, and we don't get it. So, you know, you've got bigger gaps than that in there.

So you don't have the capability to go back and retrieve data if something happens during the period that you're not with them, as an example. Anyway, so your tradeoff is having either the capability onboard or somebody on the ground to kind of stay on track of what's going on, and then, again, the tradeoff of how much you watch it.

Now, I was going somewhere with that. Where was I going?

RUSNAK: The original question was asking about these job changes, but then you were making the point where—how the staffing levels were different. In my mind, I was drawing the comparison to how the Shuttle was originally developed and then what happened in its process where they made these kind of tradeoffs.

DUMIS: Now, going back to where we were. You were asking what we did. One of the issues was ops costs. They were trying to get that down. For example, one of the tasks we had was to kind of develop some kind of model for estimating ops costs, and I did some of that. There were some other tasks which I don't specifically remember that we had budget for that we got to go

do, and basically I think it dealt with the normal functions we do, the [unclear] training, operations of flight planning, those kind of topics. Those are some of the tasks I did for Chuck Lewis, is kind of follow those tasks and kind of manage those.

Did I answer your question? Did I digress too much? All that digression was dealing with ops costs. You're kind of driven by the way you build the thing, unless you just choose not to do it.

And I will say this, that the Russians have ground sites over Asia, basically, and when they're away from there, they don't have coverage, or they didn't in the Mir station. Now, I think they're finding that they like satellites since they're tied up. They can arrange to get data more than just their sites. You know how the ground track looks like a sound wave. When the upper lobe was over Russia, they got data, and I guess a lot of the time they didn't have data for quite lengthy periods, maybe a few minutes' orbit. I remember in Station it seemed like that there were times during the middle of the night where we get one site every rev, but judging from the way theirs is laid out, it looks like they might have periods when they don't even get it every rev, maybe two or three revs before they get a pass. I don't know whether they had tracking ships or not.

But it's a matter of philosophy. Theirs operates, ours operates. How you operate philosophy and what you do up front, all that's tied together to kind of dictate ops costs. It was actually one of the big issues. And I don't know that they've managed to solve that yet, totally, anyway.

RUSNAK: In my mind, there seems to be two very related issues there. The one is what you were just talking about, the overall operations philosophy, how little can we get away in terms of being able to monitor or how many people do we need to really take care of this on the ground, and then it goes back to how do you design and build this vehicle? Do you spend a lot of money

up front to give it this initial capability, or do you try to spread that cost out by not giving it so much capability, but then you have a more expensive operations cost over the long term?

Dumis. Exactly.

RUSNAK: That seems to be what happened with the Space Shuttle was they sacrificed some of these—

DUMIS: Well, they do it with all of them. If you go look at the price of building, and even beyond that, there may be some of this you're not even—you may have to get it up there before you have the capability of even to begin to think about building it. Some of the systems are fairly discrete and obvious, but some of them are somewhat intuitive. I think ECLSS is one of those that a lot of times is intuitive on how to operate. It's not any major changes, it's subtle changes that you note when something's happening. I don't even know for sure that you could build enough full capability of managing. I suppose you probably could do a lot of it. Eventually you could. Once you go down to the litany of the way all faults appear, then you could probably do that maybe. But, yes, it is.

RUSNAK: I recall reading that for Space Shuttle they had originally planned on decreasing the number of operators once the flight rate got up to these what now seem like astronomical numbers of fifty or sixty flights a year, that they would have far fewer flight controllers when it became operational, I guess was the term they used.

DUMIS: Well, they probably do have fewer flight controllers. Well, I don't know whether they do or not now. When I was there, we had an EECOM and we had a thermal guy and a life support guy and a mechanisms guy. I think that was it. And now, they have an EECOM and a

thermal guy, and they may at times combine those two functions, at least under the crew sleep period or something like that. But life support and a thermal guy. Now they have a—I don't remember what they call him, but a mechanism guy, and he probably has a guy in the back room, so it probably has increased a little bit for that function.

I don't think it ever happened, all right, at least not to any large degree, but that was desired. It was anticipated that they might do that.

RUSNAK: So were there any significant changes in the job you were performing until you retired from NASA?

DUMIS: You mean during that Space Station time?

RUSNAK: Yes.

DUMIS: No, there really wasn't. No, there really wasn't. There was a brief change there, but that was after I notified them I wanted to retire, and I think Chuck Lewis told them he wanted to retire, and they kind of dissolved his office and we got scattered, but that was only like a couple of months. I don't think my retirement had anything to do with it. It was probably Chuck Lewis' announcement that had something to do with it, dissolving the office, anyway.

RUSNAK: What impact, if any, did the *Challenger* accident have on the activities of the Space Station office?

DUMIS: I don't know that there was any major impact other than we were all shocked with the tragedy. I guess something like that doesn't happen. I stopped whatever I was doing that morning to watch the launch, and I guess most people do that. It's kind of a significant event

and everybody now holds their breath for two minutes after liftoff, if it last that long. Then they can relax and feel like they've got a good chance for another year on the job at least, or a while longer on the job. I think everybody realizes that we can't do that very often and continue to do this space program.

I don't know that the activity made any significant directional changes. In fact, I don't recollect any specific activity on Station that was majorly affected. Now, it may have been in other areas. I'm sure that was a significant event that it affects all your thinking. But I don't think there was any programmatic change or anything like that that I noticed. At least, if there were, I don't recollect them.

RUSNAK: When you did decide to leave, what was your motivation then and did you have plans for after you were retired?

DUMIS: Yes, I did. I wasn't doing what I really liked to do anymore. I mean, I enjoyed doing what I did, and basically I didn't really have a specific job at the time, particularly after the office dissolved, and I had an opportunity to go somewhere else, and economically it seemed like it made a good idea. And I really enjoyed it, I mean, not to say I didn't enjoy my work over there, but I've enjoyed this part of it, too. I talked to a guy that I'd worked with before, and he had an office over at Rockwell, and he said, yes, he would do that. So I took him up on it.

RUSNAK: Let's talk a little bit about some of this work that you've done since then, because you stayed involved with the space program in a very active sense.

DUMIS: When I first went to work for him, for a couple of months—two, three, four, or five—I was in an office that worked [unclear] stuff, which, truthfully, I just didn't like, because it seemed like the job was not substantive. It wasn't much there to do, but they had this task

coming along the line to deal with the launch commit criteria [LCC] which I kept hoping, “Let me have that job.” And I think the reason I got it, because nobody else wanted it.

The NASA guy they worked for was Dick Hodimache [phonetic]. I like Dick, but he was a tough guy to work for, and a lot of people found that difficult, but I liked him. He’s the type—get used to him, get used to his ways. But he was okay to work for.

So I worked that for, gee, ’87 into ’89. Basically what we did was, after the *Challenger* accident, we had to go back and redo that. We went back and redid the launch commit criteria. Have you heard anything discussed about the launch commit criteria?

RUSNAK: I’m familiar with what they are, but perhaps you can go through this period for us.

DUMIS: Basically what it is, is that you establish the criteria you have to meet to launch. In other words, in your particular system—although I didn’t work a specific system, I was kind of the integrator of the thing—you define what’s an acceptable condition to launch. In other words, if your freon pump loop suddenly went down, one of the freon loops, you wouldn’t want to launch. Okay? If an APU started and then cratered, you wouldn’t want to launch. You wouldn’t want to start off from a safe condition, sitting on the ground, with this bad condition, because you probably would have a tough time making it if one more of them failed. Certainly on some of your aborts you would. And if you lost all three of them, you probably wouldn’t survive. The same with hydrau—. Anyway, that’s basically what it does.

Depending upon how critical the system is, they start timing out before launch. For example, most ECLSS functions timed out like two minutes before liftoff. I mean a lot of them did. Some of the prop [propulsion] functions, of course, you don’t really start kicking in till the last ten seconds. So the main engine stuff went right on up to the very end.

But we periodically go through a—you get some taskmaster to conduct a review of that stuff, to go through and scrub it, to get rid of stuff that could call a scrub that is unwarranted or to

better define it or set a different timer, whatever. We did some of that. We basically redid it all. Of course, at that particular time, we were moving from just a totally paper product—typewriter, paper—to an electronic system. So I got to define the criteria for the system, and I basically designed the format that they still use in their electronic system. I think they still use it. I mean, it wasn't any great task, but you still had to do it.

Then you had to go put all this stuff together and, of course, periodically people make changes. It's decided, "Okay. We missed it this time. We need to tweak this a little bit." And you had to go and make changes to it. And that has to go through program-level boards to be approved. So basically they submit a change, you process it through and bring it to board, and whatever happens—if it's approved, you incorporate it in the document. So basically we manage the document.

I did that till '89. I work for Rockwell, who actually owned our stock, but our particular branch of Rockwell, our VP was Glynn [S.] Lunney, and Glynn Lunney was also president of Rockwell Space Operations Company, a subsidiary. He called me over to his office one day and says—or actually, I got called by Sid Jones and says, "We'd like for you to come do some work on this assured crew return vehicle study."

And I says, "I don't think so. I don't think I want to do that."

And I don't know, a few days later I got a call to come over to Mr. Lunney's office. So he goes in there and he gives me a spiel and says, "We'd like for you to go do this."

And I say, "Do I have a choice about it?"

He says, "Sure. This is America." [Laughter]

But anyway, I wound up doing that for a year. That was basically a study to define—our people in Downey [California], which was where the main plant was, were doing this study, and they wanted somebody with some operations background to provide an operational viewpoint and make sure the operation considerations were included. And so I went off and did that for a year.

I think there was a Phase One of the study, or whatever phase we were in, that's what that year took, and we delivered a product. Then things kind of quieted down on it, and my boss from the LCC world called over and says, "Hey, we'd like for you to come back." Actually, he was pretty angry when I left, but it didn't seem like that—I've kind of come to the conclusion that you kind of go with the way your highest-level boss wants you to go. It seemed like it was good politics. But he was really angry when I left. But he calls and says, "We'd like you to come back. If you come back, we'll give you a promotion," and some other goodies.

Of course, at that particular time, things were beginning to phase down a little bit. I called the guys that I was working for on this project and told them about the offer, and he says, "Well, it might be a good idea if you took that." So actually, it turned out it was an opportune time to do it.

So I went back and worked that up until '93—'92, I guess it was. They were going to move the activity down to KSC. There were two guys working it here, and we were going to lose one, I think, the end of the fiscal year. So in August, I went back and worked the MOD as a subcontractor to the MOD doing some stuff, but that's another one of those tasks that didn't seem like—once I got there, it didn't seem like it had much substance.

So Joe [Joseph E.] Mechelay was putting together this Rockwell team to do Mir work for systems, and he had inquired, asked if I would be interested and I called him up and asked him if he still had an opening, and he said yes. So I went back over there and worked that for five years, and that was fun. I like working for Joe. Joe's a good guy.

RUSNAK: We interviewed him for the project about a year ago I guess.

DUMIS: Joe's kind of colorful, isn't he?

RUSNAK: He's a colorful guy, yes.

DUMIS: He's a good guy. A lot of people have trouble with him, but he really is not near as—he's a good guy. I like working for him. The one thing about it is that you always knew where you stood with him. [Laughter]

RUSNAK: There's something to be said for that.

DUMIS: Yes. And if he wanted you to do something, he didn't mince words about it.

That was very enjoyable work. I enjoyed working on Shuttle MER. It's almost as much fun as being EECOM, probably was close to it.

I also got to work with Hank [Henry A.] Rotter [Jr.], who I've known for a long time, worked around him and interfaced with him quite a bit. Have you ever interviewed him?

RUSNAK: No.

DUMIS: You probably ought to consider doing it. He's in engineering. He has an extremely keen memory about a lot of stuff that's happened. He's got a lot better memory than mine is about problems he's encountered and stuff like that in this ECLSS world. I think he might shed some light on the thing. He still works over there.

But we had some new guys from Downey and then some Lockheed guys, Rockwell. It was a nice group.

But we did MER support. We had a lot of interesting activity. We had some problem with the flash evaporator that it kept shutting down, and MOD, the engineering guys, when they developed this thing and they tested it in a chamber, they developed a procedure that if it froze up, which when you expose—basically what an evaporator is—I don't know whether you know anything about those things or not, but basically you take water and you boil it for cooling. The

boiling point of liquid is when the vapor pressure over it equals the atmospheric pressure, and if the atmospheric pressure is zero, then it will boil right down close to thirty-two degrees. So basically that's how we cool, is have it set so it operated at forty degrees. But when you spray water, you always risk getting ice, because ice will form if you're not careful about it. And periodically that would occur. The surfaces in there had to remain fairly clean, and if you get too much corrosion, you get places where ice can form and build up. But what happens is you spray water and it hits these hot surfaces and picks up heat and evaporates.

The procedure they developed actually worked to get rid of the ice, but it took an awful lot of effort to convince MOD that it would work, and we finally were able to do that. [unclear] say, "Do this procedure." And they'd do it and it works. And finally their resistance crumbled and now they use it whenever they need it.

They developed a couple of bags, I think it would hold about 120 pounds of water when they were full. But they were continuous. When the fuel cells generate electricity, it produces water, just like they did on Apollo, same type of stuff, except we do a lot more of it. I think the Shuttle carries four oxygen tanks, and each one has about 900 pounds of oxygen in it, and four hydrogen tanks, each one of those has about 100 pounds of hydrogen in it. So all that ends up to the water you produce except you wind up with still some oxygen and hydrogen when you land.

So we store those in water tanks, and the crew drink some of it. It's real pure water except for a little hydrogen in it. And the rest of it we store, and the excess we just dump overboard. We also store condensate and urine in a tank and we dump that overboard. They're separated systems. We had a couple of bags that we used for contingency containers in case we had some problem we needed to use something besides those tanks.

In fact, on one of the flights, we were rocking along and we began to notice a high nitrogen flow. The water tanks were pressurized by nitrogen, and we had flow meters on the nitrogen and oxygen systems, and we noticed the high nitrogen flow. Eventually we determined that it was a hole in the waste tank, which was the urine and condensate. What happened is we

have a bladder inside the tank that holds the water, and then we have nitrogen and pressure around it that pressurizes the bladder so that we can force water out of the tank, otherwise you couldn't get it out except for the pressure of the bladder.

What happened, somebody apparently had stepped on or kicked the outside wall of the tank and put a dent in it, and as the tank filled up, that bladder came up beside that dent and apparently that side of it bound up, and I guess the other side began to pivot till it got to the point where it couldn't move anymore either and then it punched a hole in the side of the tank. I mean, it's hard to imagine a little old condensate separator, urine separator making it happen, but it did. So we had nitrogen escape.

So basically what it amounted to is, we lost the services of that tank, so we had to put the urine and condensate in a CWC, which is called a contingency water container. It's a 120-pound bag.

But that particular one that they had at the time, they had a beta cloth outside and some kind of a liner that was watertight, but it was a woven material. It wasn't airtight, so it smelled to high heaven. I think they actually had to dump out the thing, so they had to squeeze it to do it. I mean, the crew really complained about that, so we had to rebuild that, get some kind of material that held gases very well, and something at least a molecule the size of oxygen, I think whatever that smell is, about the size of a molecule or bigger. And we also made it stronger so it could ideally withstand system pressure. In fact, when we tested it, it would take more than a system pressure. The one we exploded did. We did that.

We found out that a doctor came over and told us that they had done some—I guess some studies of astronauts and found out that they had significantly higher instance of goiter than the general population did. What we did, we sterilized the water in the tanks. We passed water coming in from the fuel cells or water going into one of the tanks that they drank out of—they don't drink out of all four water storage tanks, but they drink out of the one. They had passed it through a material that puts a small amount of iodine in the tank, and iodine, of course, is an

agent in goiter. So basically we had to come up with a device to take the iodine back out when they drank it. So we did that.

RUSNAK: This might be a good place for us to pause, because we're almost out of tape.

DUMIS: Some of the sidelights during that dead period between the Apollo-Soyuz and Shuttle, it was literally dead. It was hard to find stuff to do. He used to have lots of time to write stuff, you know, like got in the habit, we had to write a section of the activity report every week for the section. Usually I'd wind up putting some other stuff at the end of it, you know, just personal stuff. [Laughter] Of course, we all had nicknames at the time. There's perhaps a kernel of truth in this, frequently there was very little more than a kernel, but I think it kind of helped morale, keep morale high. But we had time to do it.

I always thought it was kind of a good idea to have fun on your job, but I don't feel I typically ever let it interfere with—I mean, I was serious about my work, but I think you can be that and still enjoy the job, I've always worked around—for the most part, worked around people that it was enjoyable being around, guys I liked real well.

We had a good group then. It may be hard to remember. It was William [V.] Bates [Jr.] and Larry [W.] Keyser. Larry Keyser was sent to us by [Eugene F.] Kranz. We all called him "the spy." Who else was there? The kid. Gary [B.] Evans, was a guy, he hired [unclear] Rockwell late in the Apollo Program or during the middle of the Apollo Program, I guess it was, and he has a very youthful-looking face, so he's always called "the kid."

Bates was called the master. You can kind of imagine why. Sy [Liebergot] was "F-Stick" and Gene Tule [phonetic] was called "Gobs," which is a shortened Gobbleton. I have no idea why he was ever called that. It never was explained to me. Steve [Jimmy S.] McLendon was called "Stevie Wonder," of course, obviously. Somebody else I'm missing here.

RUSNAK: What about yourself?

DUMIS: Oh god. I think “Dr. Doom,” first syllable in my last name. Probably others. About the most common one is my last name, the most common spelling of it is D-U-M-A-S. That just leads to all sorts of variations, particularly if you add an “S” on the end of it.

But there were four guys. We had two rooms and four guys in each room. As it worked out, we had D. Master, D. Spy, I don’t remember which, somebody else in there. Gosh, I’ve forgotten the name. I mean, I haven’t forgotten the name. I just forgot who was in there. That was D Troop. Then F-Stick and F-Gob and F-Wonder were in the F Troop. But, anyway, I think some of the guys enjoyed that particular aspect of the thing. So, anyway, but it was kind of a dead time. We had time to be a little lighter.

I first met Sy when I walked in this building in November in 1964, and I walked in Building 30 in 1964. He and I still go to the same room occasionally over in the MER. Sy was always fun to pick on because he never retaliated, yet he was good for a run on most anything.
[Laughs]

One time during Skylab—I hope I haven’t mentioned all this before, have I?

RUSNAK: Well, you did tell us one story about how with Sy, you had posted a note involving, I think, Jim [James A.] McDivitt.

DUMIS: Oh yes. Well, this was another time. This is during Skylab. The Station crew, they mention people by names and call signs. During Skylab or Apollo, they never even mentioned our call sign, let alone any of our names. They even let guys talk directly to the crew now. But during Skylab, we doctored a transcript that had the crew saying, “We’re naming today—.” I don’t remember exactly why, but Sy Day or Sy Liebergot Day. What they did is that they had somebody transcribe the air-to-ground, provide transcripts of it. And so we did that. We put Sy

Day. I think he spent a good part of his shift tracking that down before he realized we were pulling his leg. But, you know always looking for the glory there, but it's always reflected glory. But, anyway, like I say, he's always good for a run on most things.

One time, I guess it was before we actually started flying the Shuttle, but it was probably while we were simming it, I had a bunch of—I don't even know why I did this, but I did it. I had a bunch of empty Pepsi cans in my office, sitting around, and Milt [J. Milton] Heflin [Jr.] come over and strung those up to some kind of string and tied it to my chair, and then I was outside the door and they dialed the phone and I went over to get the phone and I had to move the chair and all those things came crashing down. So I figured out who did it, so I collected more of those things and I went out and dumped them in his car, right in the floorboard of it, so he had to deal with them. It was enough to fill up the front floorboard of the car. That was about 11:00 o'clock in the morning or 10:30.

About noon, he had just got word his father died, so we had to go back out and get the cans. [Laughter] Sy took pictures of it, with them in his car, and he posted them on the bulletin board, which irritated me because I kind of wanted to still do that to Milt. I think Milt had to go by those pictures a few times before he recognized it was his car. Of course, he never knew anything about it.

But anyway, so I collected a few more, and then one day we finagled a key to Sy's car. I think Doyle [G.] McDonald asked him to let him drive it and had a key made, or let him go somewhere in his car and had a key made. I wished I had put them in the front seat of his car, but I always felt like Sy would just rake them out on the ground in the parking lot. He probably wouldn't have, but he might have. We just put them in his trunk.

But I mean, I'll tell you what. He had a Cadillac at the time, and Cadillac has those—you pull the trunk lid down and there's a mechanism that catches it and automatically locks it. Well, when it did that, you heard those cans crunch. [Laughter] I mean, there was enough of them in there, it was full.

He didn't know anything about this till he went out to the airport with his wife one day to pick up his father-in-law, and he opens the trunk to put his father-in-law's luggage. But anyway, I still see that picture, but anyway.

Go ahead with what you—

RUSNAK: But he still never retaliated?

DUMIS: Oh, he never retaliated, no. Like I say, he was always good for that because he never retaliated.

RUSNAK: Was he just a good sport?

DUMIS: Oh, no, he wasn't that good a sport; he just didn't retaliate. It was probably a characteristic that it never occurred to him to do that, I guess. I don't think we picked on him unmercifully. He may have retaliated in his own way, but he never did anything like that. That was just kind of the stuff that we did back then. If they could find something, that's kind of like wearing a sweater with a loose thread hanging out of it. If people find a loose thread in your personality, they would pull that thread. I mean, it's just the way it was. Toughens you up.

Anyway, going on, I guess.

RUSNAK: Your stories just reminded me of other stories I had heard, which brings me to my question, which is, during any of these programs, whether it be Apollo or Shuttle, while you're working on the ECLSS systems, what kind of interaction did you have with the people on the engineering side of things, the Crew and Thermal Systems Division people?

DUMIS: Well, of course, it was basically the same people all the time. We also had systems fuel cells and the cryo at some point in time. And even after Shuttle came along and the fuel cells guys went away, we still kept the cryo because it was basically a thermodynamic system, although they have it now. I did fight them tooth and nail to keep it, because I liked that system.

For me it was a mellowing process. You know, basically, I don't know that I ever—well, I think MOD kind of breeds into this certain cockiness, and I guess I would say you have to be fairly self-confident to do the job over there anyway, because sometimes you've got to do things fairly quickly and you cannot be plagued too much by self-doubts or you go crazy. Unfortunately, if you let that go a little too far, you become a little bit cocky and sometimes it interferes with your hearing, or at least your listening.

As time goes on, particularly like in the Shuttle Program, the interface, it was almost like early on that they didn't even realize they existed. I mean, I knew they did, but the interface was kept so separate that you didn't have much interface with them. But during the Shuttle, I think they could monitor loops over there. They may have even had talk capability in our loops and right now, of course, we can talk directly to the guys. But that was more of a divisional thing than an individual thing and, of course, it depended upon the individuals. During the Shuttle, in particular—and I don't know, don't recollect—I think a lot of it had to do with getting to know the people, too, was that we talked to guys, and the interaction, I thought, was fairly smooth.

Now, some of the guys didn't act as smoothly, perhaps, but I think generally it was fairly good. I tried to accommodate them, at least during the Shuttle, as much as I could. I think it helps when you talk to people. Like I say, during the Apollo Program we didn't really have a direct interface with them. You almost had to walk over to their building—and they were like in 45 and we were in Building 30—to even see them. But usually we tried to accommodate them, and I think it's worked that way ever since. It's actually getting closer and closer.

I know that the guys, in some respects, kind of resent us in the Station program because they feel it's kind of like a "Mother may I" before they can do anything. And it's partially

because their flight directors force them to go—if you wanted to do something, “Have you guys consulted with the MER about it?” And it’s probably a good thing, but I can understand their frustration at times, too.

Like I say, my particular one was good enough that they were willing to let me come on and work with them when I worked in the MER, because they had to approve that. But like I say, as I got more mature, I realized that you need to be accommodating if you can be, and I try to do that. I try to do whatever they needed doing, if it was possible. Of course, there was also an attitude back then that now we don’t want to bother the crew with that stuff, so basically it was very difficult to get the flight directors to allow the CapCom [Capsule Communicator] to read up stuff you wanted to do, unless it was something that you just had to do. That’s a lot easier now. That was a thing that grew, and I felt like that it improved as time went on. Probably, at first I was a little bit rough, although, like I said, I didn’t know those guys as well then.

RUSNAK: You seem to have covered most of the major bases over in mission operations. You went from the front room to the SPAN room to Mission Evaluation Room. Perhaps you can just comment on what you think the advantages of that setup are and maybe how it could be improved, the way this whole system works.

DUMIS: Well, first of all, I don’t know of another system, so I don’t really have—I mean, this is what I’ve always known. That’s philosophical in nature. I think I’ve addressed some of the considerations I’ve thought about, at least as far staffing goes. That’s not exactly the interfaces. The SPAN function, they still have that, but it’s more formal now because the interfaces—you don’t really have to go through them to talk to those guys anymore. They have a loop that they listen to, and if we have something, we can call them up and say, “Hey,” pass on information or ask a question or whatever.

Typically, if there's something significant, substantive that we want them to do, or some significant information we want to send to them, we do it by the formal method of chits. It's just something that actually is a formal way of documenting. I basically understand those guys because I've been there. There's guys that, like I say, they resent the "Mother may I" thing. I think that depending upon the personalities involved, they're willing to accommodate you if they can, some of them.

Some of them are a little harder to deal with. For example, in MER, I don't think it's our job to try to tell them what to do and I try to keep everything in that tone, for me. Now, sometimes it's a little hard. For example, I try to get them to edit out stuff in chits that suggest that only the MER can make these decisions. Even if that's the case, we don't need to necessarily be as blatant about it if we don't need to be, because I think that it's just an irritation to them.

In our particular world, I think we had some problems with a guy who's no longer there. In the MER it was a little more combative with those guys, and that's not the right way to deal with them. Basically you need to consider what their job is, and it's not our job to do their job.

I work out of an analytical group. They don't have all the answers and sometimes they need some additional information. We need to provide it. If we got some kind of special insight, we can offer it to them, but we can only recommend it. Basically we have to understand that the government bought this hardware. We work for Boeing, at least some of us do, and some of us work for NASA, but they're basically doing the same role we are. But they bought it, and NASA's given them the responsibility to operate it, so it's not our job to operate it. It's our job to help them operate it if they want it.

So I think in some respects, in the area that I work in now, the ECLSS group, they have three guys who do the routine daily stuff over there. I'm one of those. And the rest of the people hardly every go over there except during missions and sometimes not. There may be a mission or two before they're there. And I think they really don't do that often enough to stay familiar

with the operation, and they certainly do not readily accept, even if they grasp the proper relationship between us and them, between the mission evaluation and the MOD. I've even had people say, "They won't do what I ask them to do or what I told them to do." Well, remember, it's still their vehicle to operate.

So you still have that bit of a problem there, but you try to explain to people when they're there that this is the way we should do this. Sometimes that works and sometimes it doesn't.

RUSNAK: Is that perspective a benefit of your experience, having worked in the front room?

DUMIS: Oh, sure. I know what that job is out there. And I don't mean to say that I'm the only guy who knows that. Certainly not that. Or even that I have the answers to all of it, but at least I kind of understand the relationship and I kind of know where they're coming from. And so therefore I can appreciate your position. I've done a number of years' work in the MER, so I can kind of appreciate our position. There's use for both of them. You just kind of got to come to a relationship.

We have had some difficulties in the Station world because of that. We had difficulties with Marshall, same way. They did not form the MER function per se, but the support function, but it's sort of equivalent to MER. Basically you make an accommodation there. I mean, you've got to do that or else. And their flight director forces them to make an accommodation. In some cases, it's fairly cooperative and with some individuals it's just begrudging, but it sort of works now. And we don't have any open fights now. I think we usually try to work out our stuff before we ever get to a formal process.

RUSNAK: Actually, I think those cover all the questions that I had for you this afternoon but I did want to see if Sandra had developed any.

DUMIS: Okay.

RUSNAK: Are there any other comments you'd like to make or areas you'd like to address before we wrap it up?

DUMIS: I don't know of any. I probably don't think so. I can't think of anything right now. If anything else, I'd probably ramble worse than I've already rambled.

RUSNAK: Well, no, actually I don't think you've rambled too much at all. I think you've answered all my questions very well this afternoon and last time, too. I'd like to thank you for spending the time with us.

DUMIS: You're welcome.

[End of interview]