ORAL HISTORY TRANSCRIPT

JOSEPH E. MECHELAY
INTERVIEWED BY KEVIN M. RUSNAK
HOUSTON, TEXAS – 16 JUNE 2000

RUSNAK: Today is June 16, 2000. This oral history with Joe Mechelay is being conducted at his office in Houston, Texas, for the Johnson Space Center Oral History Project. The interviewer is Kevin Rusnak, assisted by Carol Butler and Sandra Johnson.

I'd like to thank you for agreeing to participate in this project today. If we could, tell us something about your background, where you came from, what your interests were, and everything that led you into the space program.

MECHELAY: Well, I was born and bred in Brooklyn, New York. I guess I started a technical career at a technical high school that I went to called Brooklyn Tech. I never really knew why I went there, other than it was a good high school and I took the tests and got in. Went through the high school. One of the guys there went and took the application to NYU [New York University], so a bunch of us took the application to NYU. I went to NYU mainly because they had an Air Force ROTC [Reserve Officer Training Corps]. That was the time the Korean War was on, and aerospace was just starting.

Went to NYU and managed to get through college by the skin of my teeth. Came out. I was in the ROTC and I knew I was going to go flying, I thought, so I spent a year at Northrop Aircraft working on F-89J [*Scorpion*] and was working on a test program where they had atomic tests. They used to go every other year in the desert and out at Bikini Atoll, I think it was. I was working positioning the airplane to do that.

Then the Air Force—I finally the call to go into the service, went there, and they changed the rules on me. I got mad at them and neglected to take the flying option, and got sent to Wright-Patterson Air Force Base [Dayton, Ohio], where I worked on the C-130 [*Hercules*] program for almost three years. Then they made me an offer I couldn't refuse: either sign indefinite or get out. So I got out.

I decided to go civil service at Wright-Pat. At that time the job market wasn't as good as it was when I got out of college. I went to work on the [Boeing] Bomarc program there for about two or three months. I had a friend who worked in the [Martin] Mace program, which was the TM-76, I think, at the time. Made me a job offer, so I went and jumped from what they called the ARDC [Air Research and Development Command] side to Air Materiel Command side as an engineer. Went over there for about a year.

How things change. A friend of mine in the reserves said, "Why don't you come over to the Dyna-Soar [Dynamic Soaring] program," which was the original Air Force manned spacecraft program at Wright-Pat. So I jumped over there for a guy named Chet [Chester E.] McCollough and worked on the Dyna-Soar program for about two years.

I was trying to get a promotion there, and my boss, Chet McCollough, when they announced that JSC was going to be down in Houston, his family was at Conroe [Texas], so he knew Walt [Walter C.] Williams, who was on the X-15 program, and he went down to Conroe. In about six months later, he worked on me coming down to Houston. So I came to Houston in August '63, working in the Lunar Module Project Office for Chet McCollough, who worked for—I can't even think of the guy's name anymore.

That project stayed the same. I think Bob [Robert O.] Piland at the time was the program manager or he was the deputy. They had got rid of the primary guy, I think was a

guy named [Charles W.] Frick, before I got there. He brought Joe [Joseph F.] Shea in and reorganized, and I wound up working for a guy named Al [Alfred D.] Mardel in the—I'm trying to think what it was, sort of a system engineering thing, and he got mad at NASA and left. So I worked on a bunch of jobs generically, which was mostly working the ICDs [interface control documents] for the Cape [Canaveral, Florida] facilities, for the suits and all that kind of thing. We moved on site, I think it was in January '64, I think.

They had a process of reorganization, and there is kind of a funny story with this. About that time they decided they'd need more help from E&D, Engineering [and Development] Directorate, so they moved a bunch of the functions from the Apollo Program Office, where I worked, over to E&D. One of the guys that did move over there was a guy called Aaron Cohen. I was there late one night with Aaron and his boss and another fellow. My comment to Aaron was, "How come you're the only guy that E&D didn't want?" About a week later, my boss informed me I was working for Aaron Cohen. So it came to roost.

I worked for Aaron Cohen, and we went for the first year—the interfaces with all the parts weren't exactly working right, and Aaron took upon himself to form teams to go work that problem. We worked on that for probably about a year, I guess. Then Aaron moved over to—I guess after the [Apollo 1] fire, he became the deputy division chief and moved over to project engineering head.

I got assigned to go work on the ground operations about two months before the fire. The fire occurred and, of course, the world really turned around then. In fact, I remember I got sent to Headquarters, not understanding all the politics that'd been going on before. There had been a lot of friction between Johnson Space Center—which wasn't Johnson at that time—Manned Spacecraft Center [MSC] and the guys in Florida. I got thrown into that

arena and started out where the checkout requirements were generated by the Johnson Space Center for the Cape, and the Cape implemented the procedures. There was sort of a separation of church and state-type thing.

After the fire, I was the only guy that worked on that, because everybody else was redesigning the vehicle because of the fire. I remember for those two years I think I averaged better than thirty trips a year working that particular issue. We had a deal with California, which was Rockwell [International]—no, maybe it was North American [Aviation, Inc.]. It was one of the two; they might have changed by then. Of course, Grumman [Aircraft Engineering Corp.] working with Florida to come up with the checkout requirements. I worked on that for a couple of years.

Then when we started flying, you mentioned my boss earlier, Don [Donald D.] Arabian became my boss and I started working the flights Apollo 8, Apollo 9, and I've worked on the flights ever since. I haven't missed a flight since Apollo 9, including all the ASTP [Apollo-Soyuz Test Program], the Skylab, and all the Shuttle flights. So I wound up in the Mission Evaluation Room [MER], which was the engineering support room during the Apollo Program, working all the flights there.

Of course, the biggest one was Apollo 13, which was kind of an interesting episode. I was working day shift at that time. I went home at night and I was listening to the news, and the news comment was something to the effect that, oh, we got a little fuel cell problem. We had experienced what we called a fluctuating TCE, which was exhaust temperature stuff. I just assumed that was the problem.

I woke up in the morning and came into work, or listened to the news and found out we had this big explosion and on and on. I just said, "Gee, what the heck happened?" So I

was kind of glad I did that, because I probably wouldn't have gotten any sleep. These other guys had been up all night, so I came in kind of fresh in the morning and, of course, that was a very eventful flight about what happened.

We did all kinds of different things. In fact, we broke all the limits. We had limits like the inertial measurement unit couldn't get beyond 75 or 76 plus or minus 2 degrees and we went down to 40 degrees, and it still worked. Everything we did, all the stuff we did, turned out well. It was a very fortunate accident, in a way, in that if it had occurred about twenty-four hours later, we wouldn't have made it back with the crew. It was just timing.

That particular failure was almost a comedy of errors of how it happened. As I recall, there was an oxygen tank and it was dropped early in its flow someplace. There was a little fill tube that got misoriented. In those days, we used to do a countdown demonstration test. We'd load the tanks up and then we'd use this fill tube to get the oxygen out. When they did it, they couldn't get it out, so the only way they could get it out was to put the heaters on in the tank. They put the heaters on in the tank, and they didn't realize it, but the temperature essentially went offscale high on the measurement in the tank. This occurred on third shift, as I recall. We essentially frosted the wires. About the third day out, we had the short, the tank blew. We, fortunately, got the answer back.

One of the funnier incidents that occurred during that flight, though, was when we knew the last burn had happened and were real sure we were going to land, the Grumman people had come up with a bill—I wish I'd kept a copy of this thing, it really was a classic—and they gave this bill to Rockwell or North American. It essentially said, "Well, we're going to charge you like (and these are those days' rates, not today's rates) 40 dollars for the room, 15 dollars for board, so much for electricity, and so much for heat and all that stuff and

200,000 dollars to keep this bill quiet." Of course, this went around the control center and wound up with Walter Cronkite reading it on the national TV, this bill. Of course, the Rockwell people were not very happy about it, but it really was funny. Very well done. Of course, it was a very successful landing.

My judgment, though, on the Apollo program, I had kind of a very boring job on the Apollo 8 flight, just throwing switches on the console to get some data over to another building. I remember I was working the midnight-to-eight shift. I was really just starting to learn how the operations part of the deal went. I remember the flight was really perfect. I think we came around the last time from behind the Moon about 12:30 in the morning, and everybody's waiting for the signal to make sure of the burn because it had occurred behind the Moon. That happened. Of course, the place was packed, packed to the rafters. A half hour later, it was empty to the rafters. About two hours later, everybody was falling asleep. It was the longest night of my life. I remember going home Christmas morning, you know, and my wife said, "Was it exciting?" and I just said, "No way." The first half hour was great. The rest of it was terrible.

But I remember when we landed, they had a party over in the old Holiday Inn across the street from NASA. I don't think there was anybody more happier than the 150 people who were in that party. It was all the Apollo Program people, a few astronauts. In my mind, that was the apex of the program. There was no doubt in my mind we were going to go to the Moon. It was just tremendous. It was a real bold stunt George [M.] Low cooked up, and it just worked perfectly. It was just a fantastic flight. Of course, [Frank] Borman was a real class act to begin with. It was tremendous.

Another incident I recall, we'd got hit by lightning, Apollo 12, and I wound up talking to myself. We had hired a bunch of lightning wizards from around the country, I think New Mexico, Stanford University, and a few other places, Florida. I talked to my boss, Don Arabian, and said, "Hey, you're not going to let those guys go to the Cape. They want to run a bunch of experiments." So I volunteered to go, sort of be the chaperone and help them get their stuff and all, and did that.

But one of the funnier incidents, they decided they wanted to watch a firing at Stennis [Space Center, Bay St. Louis, Mississippi] and go see what the charge was in the clouds. So I went there and watched these guys, these scientists, professor types. We went out to the site and they had stuck their equipment out in the marshlands to see how it'd work overnight. They came back in, and a green mold in the marsh just did them in, just wiped them out. So we can't do that anymore. So they took their hardware and they had one of these little pick-up campers, tops, so they took the picker-up camper and they would literally solder their own circuits and stuff like that and make that stuff. They put this stuff in the camper. We went and had the firing. They went back out and saw that, and the vibration of the firing just knocked all the stuff right off the stuff, and they got nothing. It was kind of comical.

We had the Apollo 13 launch. We had a bunch of experiments on site around the perimeter. These scientist types put a bunch of experiments on the inside of the perimeter, so we went out at night, the night before launch, inside the gate, the perimeter gate, all the lights were shining on that Shuttle. I tell you, you just look at that sight and it was absolutely awesome. Just unbelievable to see that vehicle sitting up there with all the lights. You would just want the band to play. Really neat. Of course, Apollo 13 turned out the way it did.

Apollo 14 was another kind of different incident. I went down for that launch. We were still doing experiments. We found out we had a lot of problem docking on that flight. We had about six or seven attempts on Earth orbit, and we couldn't get it. If we didn't dock, we couldn't go. They finally hit it. We got docked and all.

Came back to Houston, and [James A.] McDivitt was the program manager at the time, as I recall. I told Jim, I said, "We've really got to get that docking mechanism back because we'll never find out what's wrong with it. Then we've had it." So I worked on him for about three or four days, and he finally gave up. Because this was a ninety-pound piece of hardware and it was a very cumbersome thing. So we worked on trying to bring that piece back. We had a mock-up over on the site, and every time we'd go do that, we would say, "Hey, here's the way we're going to do it," the guys out in California would say, "Oh, that won't work." We were wondering what was going then. So we worked on it all flight.

The day before we had to stow it to come home, we found out that the mock-up on site was an inch off, and that's where the interference was. So we came up with a solution and brought it back. Then, ironic enough, we screwed around with that mechanism for a month and never did find out what was wrong with it. So we did all the work to get it back and we couldn't figure out what was wrong.

Let's see. What else on Apollo? Another funny incident I remember, my boss Don Arabian was a very loud individual. He was very forceful. During Apollo 17, he got laryngitis, which was kind of funny. We kind of all enjoyed that. Rocco [A.] Petrone was the head guy up at Headquarters at the time, and Don brought Rocco around. I had a sign made up—we lived in Building 45 at the time—big sign. We used to have closed-circuit TV.

The sign said, "Being in 45 is heaven. Arabian has laryngitis." Rocco Petrone came by and just laughed up a storm. Arabian was, "Boy, I'm going to get you."

Anything else on Apollo?

RUSNAK: While you're going through the missions chronologically, on 15 they had the parachute failure.

MECHELAY: Yes, that's kind of interesting. I was working when that happened. We saw the parachute not doing too well. We lost it. We did not get that chute back when we landed. So we were looking, and we messed around with that for five or six weeks to find out what was wrong. We did get one of the chutes back, and it had rusted bolts in it. My boss, Don Arabian, was thinking that was the problem. I said, "No way, we can't lose six bolts all at once, no matter how corroded they are. It can't happen."

It's a lesson I really learned in my later life with NASA. What had happened was, we had a problem—I'm not sure which flight it was—but when we picked up the command module, we had some propellant on board and it leaked on the carrier. It got to be a hazard. So one of the fixes to that was to go get rid of that propellant as we were coming down on the parachutes and dump it out through the RCS [reaction control system] jets.

Well, what happened on Apollo 15 was, we didn't recognize what we were doing. We pushed the propellant out and it got ignited by the hot jets, which made a torch. As the command module moved around underneath the parachutes, the torch wound up severing the parachute lines. Anyway, the parachute came off. The lesson learned was to go build a time line of all the events. If we would have done that real early, it wouldn't taken us six weeks to

find out the problem. That message has been indelible in my mind since then, working all kinds of problems on the Shuttle and everything else. It's been an invaluable lesson. It's another classic case, when you make changes, you're really setting yourself up. You've got to make sure you're doing it right. That was fortunate. One parachute wasn't a bad deal. If we would have lost a second one, it would have been a bad deal. It didn't make that much difference with this landing. Fortunately, we had the redundancy.

Anything on 16?

RUSNAK: Sixteen, I know they had a problem gimbaling the SPS [service propulsion system] engine .

MECHELAY: Yes, it turned out there was a guy from Rockwell that was in the MER. He kind of figured out what was wrong and made the call. That was fine. I don't recall specifically what we found, but he had worked the flight control system, GNC-wise [guidance, navigation, and control], and had figured it out. He knew how the system worked real well and figured out what the problem was and said it was good for entry. They had run a check, I think, before they did the burn and he said it was fine and they came in. I remember that.

Seventeen I don't think had any particular issues on it. Of course, there was an incident with John [W.] Young and orange juice, but that's not fit for human consumption. We had a twenty-five-year reunion, I think here not too long ago. That subject got brought up and he wasn't too happy about it. Although we used to have a crew debriefing, and I had the guys from Florida bring in a bushel of oranges to sit on the desk. I don't think he thought that was very funny either.

I think the Mir mission, that was after Skylab. Skylab was probably the biggest recovery that NASA ever performed in a flight. It was just unbelievable. We start out with an absolute disaster and darn near blew the whole mission. Then we wound up recovering it. There was a funny incident I do remember. In fact, I was working the Mission Evaluation Room, and I had all the engineers in Houston. Don Arabian, who was my boss, was in Florida. Glynn [S.] Lunney, who was a program manager, was in Florida. At that time, to get to the Skylab, which was up there, I think we had to launch on five-day windows. We didn't know what we had to do and we were kind of guessing what the fix was going to be. We were working the command module part of it, the service module part of it. We didn't know what the fix was. So we were working all the flight stuff in Houston to figure out what we needed to do, guessing what the fix was going to be.

Arabian finally came back after three days and started working on the fix, which he couldn't get in in the first five-day window. It turned out to be the second five-day window, but they essentially did design, test, acceptance, everything, training, all in essentially in seven days, eight days. They put it on the vehicle, it flew and it worked like a charm. Pete [Charles C.] Conrad did it by the numbers.

That was another incident on the lightning stuff. I remember when Pete flew on Apollo 12, I guess it was, we got the lightning hit and the ground never knew what had happened. He had it all fixed before they ever knew what happened. He knew what had happened, he reset the computers, and on we flew. He was kind of amazing like that. He always looked like a card, but he was very competent. He was always clowning around a lot. In fact, I can remember him walking on the moon going, "Dum-dee-dum-dum-dum," as he hopped and skipped along the lunar surface.

The Skylab stuff, you know, we almost cooked the lab itself. I think the temperatures got up to 115, 120 degrees in the lab. It was pretty hot. One incident I recall was, although I wasn't directly involved in it, the Marshall [Space Flight Center, Huntsville, Alabama] people were wanting to change the direction so we could get the cooling down so it wouldn't cook so hot, get a different attitude. The flight director was having a little bit of trouble doing that. He didn't want to do it. I guess they finally complained to a guy named [Edward T.] Schneider, who I think was the program director at the time. He called over to control center and essentially said, "Turn it around."

So the guy who was in a SPAN [Spacecraft Analysis] room told the flight director, said, "Hey, we got a note for you. You want to do it off-line?" "No, no, no. Tell me on the loop." He kept on insisting. He said, "Okay." Then he said, "Schneider says turn it around now." It hurried up, and thirty seconds later they turned it around. The temperature started going down.

But the mission was very successful. They had a lot of failures, but they recovered a lot of failures. One in particular I thought was comical. They had a—as I recall, it was in the form of a circuit breaker. I don't remember what the title of the device is now, but they had lots of problems with them on flight. They wound up actually going EVA [extravehicular activity]. We used to have a teleprinter at the time and they put a bunch of Xs where the panel was and they put an X in this one spot in the middle of it. They told the crew, "Go out and hit it here with a hammer." It worked. They went out with a hammer, hit it, the device came back. At that time, we could fix anything.

The three missions of Skylab, we worked in the MER when the crew was up there. The flight controller went straight through, and that was a one-month mission, a month off,

two-month mission, a month off, a three-month mission, and so on. For that one year we worked around the clock. I had four guys and essentially did all the flights, all with the four guys. Whenever we had problems, we'd bring the guys in and go work them. So it worked pretty smooth and it was very successful.

Then after that, the Mir [Apollo-Soyuz] mission occurred and that went pretty good, although we almost—in fact, we did get [Donald K. "Deke"] Slayton. He wound up getting out of sequence on a switch and ingested some propellant in the cabin which made him kind of sick. So he was out of pocket, as I remember, for about a month, something like that.

Then we started working the approach-and-landing test [ALT] program, which was out at White Sands [New Mexico]. We used a [Boeing] 747 to drop the Orbiter. We were tied here in Houston along with the flight control team, and we had about, as I remember, something like 400 measurements. Palmdale [California], which was where the Rockwell guys were, had all the measurements were on board. It was kind of unique for us, because we would have the drop test program and two hours later we'd have a debriefing with the crew. Normally we didn't see them for a month, or a week or two after.

I remember one of them really was kind of funny. I was looking at the data, and it looked like we had a little catch-bottle for this APU [auxiliary power unit]. The seal leaked a little bit and we put it in a catch-bottle. It had hydrazine and oil in it. That's what it was catching. I kind of looked at the pressure and said, "Boy, that's awful high. It shouldn't be like that." So I called out to Palmdale and asked them what this other measurement was. When he told me what it was, I said, "My god, we're dumping it overboard." So we found this out before we had to crew debriefing. So we're on the loop and all the guys, the cast of hundreds out in Dryden [Flight Research Center, California], and so I told them, "We're

leaking hydrazine overboard." The guy who was [unclear] commander went off-scale high. This is bad stuff, but the amount we were dripping wasn't all that bad, but he really got upset about it. But we went and picked it up and then we fixed the problem, made a bigger catch-bottle, and got away with it.

The most significant event of the approach and landing test program was the last flight. When Fred [W.] Haise [Jr.] was flying it, we kind of set him up. Our flight control system was priority-rate limited, and when he was coming in for the landing, he was pushing the stick over and not getting everything he thought. So he pushed it over further, which made it even worse, and he essentially wound up putting a PIO, pilot-induced oscillation, into it. Fortunately, [Charles G.] Gordon Fulton was with him and told him to take his hands off the stick rather abruptly. The vehicle came back and he landed okay. That's the last time Haise went and flew.

On that program, as a special project, we wound up having a T-38 do a chase airplane with some cameras just like that one I'm looking at, and put a pilot in the back seat. Normally when we work with that stuff, we would have cameras, regular movie camera stuff. So we had this little project going where they had just started to come out with the miniatures of those things. Normally those TV cameras at that time, this was 1977, are pretty big-sized machines. I think the Japanese had just come up with some smaller cameras. I worked a little project where we put a camera in the back seat of a T-38 and essentially watched all the ALT program with that camera. It worked out real good.

A kind of incident went on when we were going to do the first manned drop test program, we had arranged a deal with the TV station out in Los Angeles to go get a helicopter out there—they had one of these roving helicopters—to go take pictures of the

first drop test program. The pilot was Francis Gary Powers. Unfortunately, though, he wound up running out of gas, as I understand it, about ten days before the test, and the helicopter went out of business and so did he. We had a no-cost contract with that TV station for the feed and all, so that didn't happen.

But the T-38 video stuff worked superb, so it was a very successful event. As I recall, I think we did do it on the first flights when we landed off the first Shuttle Program.

The Shuttle Program, I remember, we kind of trained for that pretty good. We had, I think, six long-duration sims [simulations], two of which we brought in about eighty-some-odd people from Rockwell to go support the sims and figure out how to work the system during a flight. It worked real well. We participated in the sims, got everybody trained. Then when the flight came, we had a scrub on the first attempt, and it was again kind of comical.

Bob Miner was the Rockwell representative here. We had the problem. We were suspecting software, but the software people weren't working with us and we couldn't find them. They had got lost in a closet someplace over in Building 30, and we didn't catch them for about two hours. We finally confirmed that we kind of thought it was, and they confirmed it was the problem.

What it was, I think at T-minus-seventeen minutes, we transfer the primary guidance system state vector over to the back-up, and it didn't take the first time. We found out there was a race, time race-type thing within the computer that caused us to miss it. I think the ratio was something like every seventy-five chances you miss it by one, and that's what happened to us.

Two days later—I think it was two days later—we made a launch again, and there wasn't a hiccup at all during the countdown. It went right through it, and we launched, obviously a very successful mission.

I guess the most significant problem on that one we didn't recognize for—I think it was about a month afterwards. We had some, I guess it was, acoustic loads that went and bent a strut in the RCS, and we found out afterwards. In fact, Max [Maxime A.] Faget was the guy that came out with the fix. We had to put some of these tubes of water underneath to suppress the sounds that was doing us damage with the Orbiter. In those days, it was about six months, I think, between the first two flights.

The second flight was one of the more eventful ones for me. We were all set to launch, and we started going, turning the APUs on. About T-minus-three minutes, our APU guy says, "Hey, the pressure on two of these bypass valves, check valves, is higher than they should be." It was right near the LCC [launch commit criteria] limit. So we were counting down until about 31. He said, "Okay. Go. It's okay. It's okay." We didn't bust the limit. At 31 seconds we stopped for another reason, which was a cryogenic low-pressure read, as I remember. So we kind of understood why that was happening, but then we got to thinking about the APU. We had thought we had plugged up this valve, these filters in front of the—I guess it was a filter. There was a bypass on a filter. We said, but we went and changed the oil. We'd get wax on the system and it would plug up the filter, but we knew we'd changed the oil. We said, well, that can't be.

So I was working with the California guys who was calling Sundstrand, the manufacturer. It was about an hour or so, and I had told the MOD [Mission Operations Directorate] guys what we were doing. I had told the guys at the Cape what we were doing.

We were running out of time, and I was pressing Bob Miner, who was the senior Rockwell guy here, I said, "I want an answer in ten minutes, and that's the end of it."

Just about that time, Chris [Christopher C.] Kraft [Jr.] was talking to the Cape, worried about the crew being on their backs so long. The guy at Headquarters was saying, "Well, your guys are talking about scrubbing," which was me. Kraft didn't know what it was, so I said, "Chris, yes, here's what we're doing." So he said, "Okay. Let's scrub."

All the managers at the Cape were in another conference room working another problem, the first problem. So we scrubbed the launch. They came back and found out we scrubbed. What I remember afterwards was, we had a meeting in 602 in Building 1, and I got invited to it. It was a Saturday morning and [Eugene F.] Kranz was walking in, and he was fit to be tied. He was really mad at his people. In fact, I didn't find out until a year ago what had happened. I had been telling the flight control guys what we were doing and they related to the back room but it never got to the front room. So the front room never knew what we were talking about. Again, I found this out about a year ago.

At that time, I guess Lunney, when he went through, he turned to me during the meeting and said, "Well, you handle all the launch commit criteria from now on." I said, "Fine. That's what we were doing." And that's what we've done since, pretty near.

That was kind of exciting. In fact, that was a time I think when Chris Kraft got crossways with [NASA Administrator James M.] Beggs, because we got criticized for scrubbing a launch because of oil. There were big headlines in the paper, "Change your filter instead having the Shuttle scrub a launch." That type of thing. The subsystem manager was a guy named Dwayne [P.] Weary, and they were having a big telecom at [NASA]

Headquarters and it got kind of violent between the JSC guys and the Headquarters guys on why we scrubbed and what we were doing, but we made the right move at the time.

Let's see. Next flight I remember, of course, STS-3. We wound up having to fly to the desert at that time, White Sands. I remember we were having some com [communications] problems. One of the four loops was down, the com loops. In the process of troubleshooting, we lost two more of the com loops. We were down to one of four. The flight rules said you're supposed to come in if you're down that far. Kraft just said, "Forget about it and fly."

I remember, I think it was Neil [B.] Hutchinson reading something about the press release, when he was talking to the press, and somebody asked him about the flight rule being one of four, and his comment was, "Well, flight rules are a starting point for discussion." So I cut that out, that little comment, and I stuck it on my console. Every time I heard MOD tell me, "That's a flight rule," I'd read this little note to him, and say, "Hey, well, that ain't what you said in STS-3."

The funny part is, after we landed, we had a dust storm of violent proportions out there. This dust at White Sands is like talcum powder, and it really screwed up the Orbiter big time. All the jets, a significant number of them had to be replaced because the powder got into it. It got to be pretty bad. The troubleshooting we did on the ground on the com system, it all went away. All the problems started working again. We did all the troubleshooting and the problem went away, although we knew what had happened. We had this thing called a GCIL [ground command interface logic], I don't remember the acronym. It had a bunch of relays in it that stuck, so we fixed that.

Let's see. What else? STS-3. The most significant problem I recall in the Shuttle is when it froze up, had an icicle. We had caused—I don't remember what the flight number was right now, but when we landed one flight, we noticed we had a significant hole in the OMS [orbital maneuvering system] pod. We had had trouble dumping during that flight. We had an arm on at that time, but people were just reluctant to use the arm to go outside and look. This dump nozzle is outside and just after the hatch on the port side of the vehicle. They normally didn't like to use the arm to go do things like that. But when we saw the damage and we looked at the temperatures, we knew we had an icicle. We knew we were having trouble dumping, and we knew we had the icicle. We didn't quite know how big it was, but it did do significant damage to the OMS pod. So we had this in our memory bank.

Then a subsequent flight, we wound up having dump problems again. This time we said we want a look. We looked and said, "Oh, my god." There was this icicle sticking out, something maybe two feet long. I had a guy figure out, tell me, how heavy do you think it is. So we made a judgment on the size of it. We could kind of get the size of the icicle and we guessed how dense the ice was. So I asked California, I said, "Go tell me whether this ice can do any damage on entry if it comes off." We also were working with MOD to say, "Hey, can you knock this icicle off with the arm?" We'd never done anything like that. We had blankets on the outside of that. So they'd worked all night, I guess. In fact, Sally Ride was on the simulator doing it. They came back and said they couldn't do it. In fact, I remember it was a holiday.

So I came in, and our guy was John [C.] Peck, who was an exceptional arm guy, really good. When I found out they had trouble doing that, I called John Peck up on this holiday about six o'clock in the morning when I came in. I said, "John, come on over." So

he came over and I said, “Go over there and show them how to do it.” So he went over there, and about a half hour later he came back and said, “I know how to do it.” So I said, “Good.” I remember MOD wasn’t too happy in doing it. They’d been up all night doing this procedure and they hadn’t had any success. Of course, they said, “You did it wrong. Do it again.” We got in a fight, and they decided to do it.

Then about noon that day, I got the input from California. Ben Boykin [phonetic] came in and said, “California ran an analysis and it said it’s a hazard, and we could go rupture tanks and everything else with that thing.” Safety-of-flight issue. I said, “Boy, that’s nice.”

So I tried to get a hold of the Orbiter project manager and his deputy, which was Arnie [Arnold D.] Aldrich and Dick [Richard A.] Colonna, and it was a holiday. Everybody was out someplace doing something else.

I had the gals—by the way, another funny incident, stunt. We called them "MER-maids." It was the MER, and the gals that worked there. We called them "MER-maids." I used to get criticized all kinds of times, “You know, you’re berating the girls.” Well, I got a plaque up there that’s from the MER-maids. They loved to work there. Every time I see them, they all come up and say hi to me.

Anyhow, I couldn’t find the managers for a couple of hours. I finally said, well, I’d better tell the flight control team. I called up the flight director on the black phone. I didn’t want to go get the whole world excited, and said, "Hey, we’re serious about it." I said, "We've got to knock the arm off or, if necessary, go EVA." We’ve never been EVA outside. In fact, we never used the arm either out in that envelope.

About half hour later from that, I got a call from Glynn Lunney asking if I was serious, and I said, "Yes, I'm serious." We decided to have a mission management team over in Building 45. He asked me where to do it, and I said, "Why don't you come over here. You know, you guys never come over here. Come over here."

That was a very violent meeting. None of the managers were very happy. It started with Gerry Griffin, to Kranz, to John Young, all the flight directors. We weren't very popular people, telling them what they had to do. About halfway through the meeting, Arnie finally got the message. Arnie Aldrich came by, and we convinced everybody they had to at least do the arm trick. By that time, we'd run the sim that said we knew how to do it.

The next morning we were all watching it, and it came off lickety-split just like gangbusters. It came off nice and clean. Although we had misjudged—some of our calculations had misjudged the size of it. We had put the sun on it all night, and it had shrunk a lot more than we thought it would. Turns out the ice is more like snow cone than ice, so it melts a lot quicker. That was a very successful experience in getting it off and, of course, a lot of fun.

Let's see. What other big problems? I'm running out of gas.

RUSNAK: That's okay. I've got some questions.

MECHELAY: Go ahead. Throw me some questions. My memory is fading.

RUSNAK: If you don't mind, if I could start back to the beginning and try to work our way up to that point. You've mentioned some of the things you did before NASA. You worked on a

couple of missile projects, the Bomarc and the Mace, and some other things for the Air Force. I was wondering what sort of experiences you had there, or perhaps skills you learn that were later applicable to NASA when you went over.

MECHELAY: Well, when I worked on the C-130 program, I was a brand-new second lieutenant. They had a thing called WSPO, I think they called it, Weapons System Project Office. They had sort of an integrated function where they had logistics, maintenance, and all that kind of stuff in one place. So I got a little taste of all of it. I was exposed to it, how to do stuff.

When I went over to the TM-76 [Mace] office, I had that experience and essentially was able to run reviews and stuff like that, even though, looking back on it, I was pretty young at the time. But the experience in the C-130 office, where project officers run everything, it's a small office and everybody participates in everything. It was very useful. The military tends to give their officers a lot more responsibilities, so you just learn a lot quicker.

Then we worked on the Dyna-Soar. I worked in an integration function where anything that was across the board, that's what I worked on. So if we were working on work statements, that's where I worked off. If we were working on specs, that's what I worked on. So I got to go deal with a lot of different people. I think that's sort of migrated into what I've done with JSC.

In fact, in JSC in the Apollo Program, we had a very small systems engineering office. I think there was probably thirty or forty guys, and each guy had a very finite area. You just went and did what you thought had to be done. There was hardly any constraints.

Today we've got all these boards to go through. Then we had no boards to go through. You just told the guy, “Do it," and it was done. They finally started a CCB [Change Control Boards] board, in fact, when George [W.S.] Abbey came.

I’ll give you the story on George Abbey while I’m thinking about it. I had known George Abbey on the Dyna-Soar Program. George was, I think, in configuration management. When they decided to have a resident office at Seattle [Washington] for Boeing, George, I believe, had a brother up there who worked a hockey team, as I recall, I think, and he wound up getting transferred up to Seattle to work in the resident office. There was about three or four guys. There was a Colonel Wiley [phonetic], a guy named Jackson, I think, George, and some other captain, I forget what his name was. They would go in and do all the interfaces with the visiting firemen that came in and took care of the local stuff. So George was up there. I think he had almost two years up there, at least.

Then when I came down here a little bit after we moved on site, [USAF Major General Samuel C.] Sam Phillips came in. He was a general from the Air Force. They had to move on. They were trying to hire a bunch of people with experience to go work the Apollo Program. So my boss, Chet McCollough, said, "Why don’t we go get some Air Force guys with experience to come in." At that time the Dyna-Soar program was fading fast. In fact, it may have been pretty near over with, because I came down in August ’63, and I believe that got canceled about November. So that program may have been over.

So I got asked to go generate a bunch of jobs, and Chet decided to go find a bunch of people. I invented the job of configuration management, and Chet said, “George. George worked configuration management.” So George was a captain in the Air Force in Seattle working for—I guess it was Wright-Patterson Air Force Base. The two matched, and that’s

how George got here. So we just matched him with that job. There was a couple of other military that came by. There was a guy named Oakes [phonetic], as I remember, I think came from Ballistic Systems Division. I can't remember the other guys. I know Joe [Joseph P.] Loftus [Jr.] was another military guy, but he had been here before that. I don't remember the other ones, but there was a couple of them that came and that got pulled in to get the Air Force experience.

Next question.

RUSNAK: Early in your career, a lot of the first events of the space race occurred. You've got the launch of Sputnik, and then you've got the first men going into space. So I'm curious to see what you thought about these events at the time, as someone working for the Air Force and some of these projects.

MECHELAY: I remember Sputnik, because I think I was in a bowling alley at Wright-Patterson Air Force Base when that happened. It was a shocker. In fact, [John H.] Glenn's flight, I was up in Wright-Pat and we were listening—no, [Alan B.] Shepard's flight, because we were listening to the fifteen minutes it was. I think you got kind of a letdown that they were that far ahead of us. At that time we had lots of things going in the water. But that's the space business, I think why I came down here. That was the frontier.

You know, me being a Yankee and living in Dayton, Ohio, moving down to Houston, Texas, never been there, that's kind of a big move for a family that had never been in Texas before. Actually, I was down here in the service, for about eight or nine weeks in the middle of the summer, in San Antonio, which was really pleasant. [Laughter] I do remember that

gas was nineteen and twenty cents a gallon when I came down here. I was always afraid to go into these local non-normal gas stations. At nineteen, what are they selling? Water or something? But nineteen cents a gallon was the standard price.

RUSNAK: Wish it were like that today.

MECHELAY: Yes.

Next.

RUSNAK: You talked about the Dyna-Soar. I was wondering if you could tell us a little bit more about that project and specifically your role in it.

MECHELAY: I worked in the integration office for the Dyna-Soar Program for this guy Chet McCollough. We had, I guess, about ten or twelve guys and essentially worked all the stuff across the board. We had one safety guy, one maintenance guy, and then one guy that worked the boosters.

We kept on having different boosters every year. That's what probably killed the Dyna-Soar Program. We'd start out with Titan I. Every November we wound up with a new booster. So we had Titan I, Titan II, Titan III, and there was a lot of politics between the Wright-Patterson guys who were aeronautical guys, and the booster guys. The booster guys wanted symmetrical payloads and Dyna-Soar was not a symmetrical payload. They were also supporting a blue Gemini-type thing, which was the Ballistics Systems Division version of the manned space program.

The Dyna-Soar was a very aggressive technology advancement. I mean, they had stuff on there, in fact, some of the stuff today we don't even have. They were really pushing the state of the art in lots of arenas. We had an integrated power and cooling system. We had a great big hydrogen tank in there which provided the fuel for the source as well as the cooling and put heat in there to get the propellant out. We had a real fancy structural material, molybdenum and columbium, on the structure. They had wire brush wheels. I mean, they landed on lake beds with wire brushes. All kinds of fancy—they had integrated cooling system in the panels for the wall. It really pushed the state of the art.

I'm not too sure we've ever been successful, thinking about it now. As far as we were pushing it, there were too many places we probably could have made errors. That was, I think, limited to three times around. I think why it went down was it wasn't a weapons system. At that time the Air Force budgets were going downhill. It was really a development program for—weapons system, they didn't know what it was. Nobody could justify. Why do I have to have a weapon system in space? Ballistic missiles at that time were prevalent. That would satisfy the requirement. And politics finally got in.

It was a really good learning ground for me because I got cross-systems. Before that I'd really worked airplanes and a little bit of the TM-76, which was a real obsolete missile system, although it had a fancy guidance system to it. So it was learning how to integrate technical stuff. I worked the specs. Anything across the board was the stuff I worked.

RUSNAK: Were there any lessons learned from that program that the Space Shuttle could have or should have taken in?

MECHELAY: I'm not too sure. I guess some of the integration stuff probably the Air Force did pretty good. NASA did a lot of things right, too. I think the biggest difference is NASA really got into details. Their engineers really worked the details of it. The Air Force is more "Let the contractor to do it all." There's a time and place for both of those.

The lesson learned is, get the smartest engineers you can get and get a strong manager. If you don't have those, you could flounder. Apollo was blessed with some really strong management. I think Bob [Robert R.] Gilruth started it. The secret to it is to get good lieutenants, and Gilruth had superb lieutenants: Kraft, Faget, those types of people. In my mind, you've got to be very selective on your strong lieutenants and implement it. Apollo had those. They didn't have a money problem, for one thing. Schedule was prime. After the fire, safety was very prime, obviously. But they had excellent, top leadership all the way down. George Low was master at dealing with all these very strong managers, how to go keep them in line to get the job done without overriding each other. He was superb at that.

RUSNAK: You mentioned how the Air Force style was more to let the contractors do the work. NASA, at least in the Mercury and Gemini Programs, their engineers were more sort of hands-on. Once you get into Apollo, they're getting more to this systems engineering style where you get something close to the Air Force. So I'm curious how you, as someone coming out of the Air Force side of things, meshed with the NASA people who were kind of out of this other sort of technical tradition.

MECHELAY: Well, the Dyna-Soar at Wright-Pat had a fair engineering staff. Like I say, the weapons system in the C-130, there wasn't that many engineers. They relied on an E&D

Division to go give them some help. They were kind of old-fashioned in how they did it. But Dyna-Soar wound up having a pretty significant engineering staff. I think when you start out with it, you've got to have some solid government engineers involved in it and then transition. I think that's the way to do it. What you've got to avoid is having multiple engineers watching multiple engineers. You get too many of them and you spend all your time fighting each other.

RUSNAK: How well did NASA avoid that, or did they?

MECHELAY: They didn't. In fact, we had lots of engineering groups. Anytime we would do stuff, it would be five and six engineering groups. We'd have like the guys in California with Rockwell and we had a Rockwell contingent in Houston. Then we'd have a civil servant contingent here in Houston. We'd have an MOD contingent in Houston. Everyone plays a part on it, but it's a very expensive way of doing it.

In my mind, the optimum way would have one central engineering organization, and they would do all the engineering across the board. Then you'd have an ops team that went and implemented what the engineers told them to do. You wouldn't have all these different sets of engineers. But you'd have to go find a place to do it.

I've often thought if you put everybody in Florida, that's probably the optimum place because most of the problems are in Florida. That's where you find them. So the cheapest way to do it would be get all the engineers in one place and have one set of engineers work all the problems.

RUSNAK: Speaking of engineers working the problems, where did the idea for the Mission Evaluation Room come from?

MECHELAY: It was actually part of Gemini, although I wasn't part of that. Arabian really started that, putting an engineering room together where you'd have the engineers work the problems. The MOD guys are very good at—in fact, Apollo was a lot simpler system than the Shuttle. But they would learn everything from the engineers and then sim and sim and sim and really wind up knowing up the system worked better than the engineers did when they got through with it. But you need the engineers. Every time you get off nominal with the hardware, then you really need the engineers to understand how it's designed and what its limitations are. The operations guys usually don't have that knowledge at all. They only know what they're told, and a lot of times engineers don't tell everything they know. In fact, they don't know what they know. Until you work the problem, you've got to go get the design guy and figure out what he did and why he did it and go work it.

In today's environment, we probably work closer with MOD than we ever have in the past. When we have a problem right now, in fact, the first guy that I'd call and say, "Tell MOD, send your right engineers in. Here's the problem. Give me the engineers that work that problem." Then we'd get all the design guys together and work with MOD. It works real well. In fact, it works a lot better now than it did on Apollo. In Apollo days, there was a little bit of competition between the two. But actually it works pretty smooth now.

RUSNAK: How receptive were the operations guys to having something like the Mission Evaluation Room?

MECHELAY: In the early days, not very good. In the early Shuttle days, they'd just as soon, "Don't help us till we call you." I had lots of discussions with the various members of the flight control teams saying, "You don't know when you want my help. There's lots of times that we spot the problems you don't even know is there." So we've been fighting this battle for a long time. There's any number of times that we—for instance, the icicle was a classic case. There's a case where they didn't know they had a problem. We told them what it was, and we had a lot of fight with the management, but we were successful. We were successful with the APU scrub. We scrubbed it for the right reason. There's any number of items you go through.

They do everything very well procedurally. They have it all document, and they follow their rules exceptionally well. But sometimes you can't prejudge all the rules to get—there are just circumstances, like Apollo 13 was a circumstance. Even though then we had built in ways of transferring power from the command module to the lunar module. We had put that hardware on board and figured that out a couple of years before that ever happened. So that was done with malice and forethought. But we didn't, obviously, anticipate losing all the power. That was not a credible failure at the time. But we did have the lifeboat mode. It was in the procedures, and hardware was built to do that, although we wound up having to invent some hardware for some other reasons. They made a lithium hydroxide canister thing out of cardboard, stuff like that.

RUSNAK: Can you give an idea what the MER was like during a mission? Who was in there? What was the atmosphere?

MECHELAY: In the original MER, we had little TVs. We would take Polaroid pictures of the data and hand-plot it. I mean, it was pretty primitive.

We'd bring the contractors, a team of contractors with us, and we'd have all our civil service help and whatever contractors they had. We didn't have all the discipline that flight control has, as far as quiet and all that, but come launch time, really, it was kind of funny. T-minus-nine minutes, that room gets deathly quiet. You let guys talk. In fact, I used to say I didn't care who was in the room, as long as when we had a problem, people stayed out of the way. So you don't bother me working the problem, then you can come in here. If you bother me, you're going to leave. And usually people respected that. If we had a problem, people would just shut up and watch us work.

In fact, you talk about [STS] 51L, I think that's kind of one of the strangest phenomena I think I've ever seen. I was there for the launch and I was watching the APU display, and I saw it go LOS [loss of signal], didn't have any data. Usually you had that happen but not that long. I said, "Gee, something ain't right," and I went and looked up at the screen and I saw the vehicle and I said, "My god, we've got an RTLS [return to launch site abort]." Then I looked at it, nope, it's not that.

The room was absolutely quiet. Nothing was spoken, nothing was said. The loops were absolutely quiet. The only comment was Jay Greene trying to get some safety guys, chasing them down. There was no speaking whatsoever.

After five, ten minutes, I said, "Well, I guess I've got to start doing something," and just told the guys, "Okay, I want to go do these things, get this data, get that data." I called over to flight control and said, "Hey, I wanted a flight director, I wanted a crew person, and I

want them over here in an hour, and we're going to figure out what we're going to do." So they sent over, I think, Randy Stone and Hank [Henry W.] Hartsfield [Jr.] came over. They were the two we got. I think we picked up a lawyer along the way, press guy.

We had a meeting about an hour after the accident. I'd sketched a bunch of stuff on the board. I guess Henry [O.] Pohl was there and Lenny [Leonard S.] Nicholson. We said, "Well, here's how we're going to organize. Here's the thing we're going to do," and about the schedule we're going to work. In fact, we looked around and said, well, you know, all the management's at the Cape, we looked around, "Who's going to be our leader?" We essentially elected Lenny Nicholson the leader. He seemed to be the most senior guy in the program office. "You're the leader." And we went ahead and started doing our work. But it was amazing how quiet—the accident occurred and there was absolute death silence. Nobody was say a word. Just unbelievable.

I did real well, and then I went home, then I lost it. It was kind of a bad day.

RUSNAK: Did you have much opportunity with either those or any other flight crews during your—

MECHELAY: Yes, I used to know all the old ones. The guys with gray hair I know. I didn't know all that flight crew. I knew Judy [Judith A.] Resnik halfway decent and a little bit of [Ellison S.] Onizuka, but I didn't know the mission specialist types. Judy I'd run across.

In fact, I've got to tell you a funny story about Judy. On STS-2, which was the first time we had the Canadian arm, we had an engineering place there for the Canadians. Judy was the astronaut assigned to the RMS [remote manipulator system], so she was sitting in the

back of the room. Right next to them was the ECLS [environmental control and life support system] guys who worked the potty. In those days we had potty problems. I was over there talking to the crew guy—the ECLS guys about the potty problem not working very right and all that. Judy kind of turned to me and said, "What are you going to do to that potty?" and stuff like that. I turned to her and said, "It's called toilet training." [Laughter] She just kind of put her head down.

RUSNAK: When you weren't working in the MER during missions, what was essentially your day job? What kind of things did you do?

MECHELAY: My day job. It varied. We usually worked all the problems post-flight. Then when I was on Apollo, I worked a lot of times the checkout requirements at the Cape and writing the reports and stuff like that and working the problems. In the Apollo days, we were launching every two months, roughly, so there wasn't much time between a flight to go clean up from one flight to the next. That's kind of true in Shuttle, even though we're not flying that much. It always seems there's another issue on the table to go do. Right now, I've got a bunch of guys that work for me essentially do all the data evaluation. For instance, this last flight, we just had a data review meeting in California on all the flight data to see what problems came up. It seems like the less we fly, the more problems we have, for some reason or other. Of course, flights just get the adrenalin up. People just love to fly.

RUSNAK: Your boss, Don Arabian, had some things to say about the checkout procedures during Apollo and what should be done at the Cape and what should be done at the

contractors' and these kinds of things. So I was wondering what your feelings on the checkout procedures for Apollo were.

MECHELAY: Again, what drove those after we had the fire, it was a significant political battle. In fact, the battle that occurred before that, who controls the program. So the Cape said, "Hey, we're in charge of the checkout. So we're going to write the [unclear]. You just tell us what you want us to do in requirements." They didn't want us in the requirements put down, tell them how to do it. So there was a lot of gnashing of teeth during the Apollo Program in doing that.

In fact, we've got some of that problem on Shuttle, too. We had some of that. The Shuttle problem, though, is after 51L, we were going along pretty good. We were launching them about—in fact, between 51L and the previous flight, I think it was only three weeks. It was something pretty short. We were getting to the point we were running out of gas and people how to do that. I only had three guys working around the clock. We'd burn up two weeks in a mission, at least. Then if you're flying every three weeks, you just don't have any time to go do anything. So we were running out of space.

After the accident, they wound up changing a bunch of what they called the FMEA/CILs [Failure Mode Effects Analysis/Critical Items List]. We reviewed a whole bunch of paper. I wound up taking on the task of doing the launch commit criteria. As a result of that, they set some rules up to institute a bunch of checkout requirements on the Shuttle Program, and they simply overdid it. So we took it upon ourselves, trying to reduce those. We've had three different scrubs to go do that, with the Cape involved and running through management and all.

But on the Apollo program, it's a lot different. One, there was no turnaround. We flew a new vehicle every time, so it was a lot different process. You had to check it out and make sure it was working, and you did everything essentially once. Then it flew and it was gone. Shuttle, you're recycling it. We're up to twenty-five, twenty-six flights on a vehicle. So it's a different ball game. I think the procedures, they could be looked at today and cleaned up for Shuttle. On Apollo, the system was a lot simpler. We essentially checked out everything at the Cape, so it was a lot easier.

RUSNAK: Moving on to Skylab, you talked a little bit earlier about some of the things that were going on there, so I wanted to know what your direct role in Skylab was. Did you have a chance to work on the parasol?

MECHELAY: No, in fact, I was working the flight stuff. The Skylab was up there, and JSC had pieces of that. We had the EREP [Earth Resources Experiments Package] stuff and some of the medical stuff was ours. And we had to figure out what we were going to do with the command module and service module on the ground, which was also ours. For instance, at that time we had fuel cells we couldn't shut down, so we had to keep the fuel cell running for a long—it has by far the longest live fuel cell we ever had in the Apollo Program. I mean, it was running. We couldn't shut it down. So we were working all the issues with, what do we do with this command service module we've got on the ground, that's sitting there waiting for the parasol to come in.

Arabian came back. He worked the parasol and I worked the flight, so I didn't see him for two weeks and he didn't see me. I did my thing with figuring out what we needed to

do is keep the flight running, and they worked the fix. We made some provisions that we thought what the fix would be weight-wise and that type of thing. When they came around with the fix, we were ready to go. So we were really separated. He completely dominated the parasol scheme with—I forget what the guy's name was.

RUSNAK: Joe [Joseph P.] Kerwin was telling us about the preparations for that flight and how there was a whole lot of equipment added to the command module to bring up there. He expressed a little bit of concern about how their couches are supposed to stroke upon landing, and there was an awful lot of things underneath their seats that perhaps would prevent that.

MECHELAY: Well, we designed some space for it and weight for it. I'm not sure how much they violated the envelope. I know we did go over the life limit we had on the fuel cell. We were beyond any testing we'd ever done before. In fact, I remember Guy [Joseph G.] Thibodaux, who was the Propulsion Division chief, we argued one night and he said, "[unclear] What do you want me to do?" I said, "We don't have anything better." I said, "We've got to get up there in two weeks." He said, "We can't put another one in. We don't have one." So we flew it.

RUSNAK: Well, under these unusual circumstances—

MECHELAY: Yes, we didn't have any choice. It worked fine.

RUSNAK: As Apollo and Apollo-Soyuz and Skylab, these things are moving on, you're getting ready for Shuttle, what was your first exposure to the Shuttle Program, your first duty?

MECHELAY: The ALT program, Approach and Landing Test. There was sort of a dull spot in there between Mir, Mir was just sort of a stopgap for a week, but between the end of Skylab and ALT, I wasn't that happy, because things weren't happening. I wasn't into working the Shuttle Program at the time. But when we started the ops part of it, then I started getting involved in it. ALT started, picked it up, and then we saw work in a lot of longer-duration sims and stuff like that and getting ready, putting a contingency plan out, all that kind of stuff that goes with that. In fact, at that time I think that we had layoffs at JSC. I think they were cutting people out at that time.

RUSNAK: Yes, the reduction-in-force thing, I guess they called it.

MECHELAY: Yes. The RIFs.

RUSNAK: You've spoken to us in pretty good depth about the Shuttle Program. Could you tell us a little bit about the types of things you're doing now, what your current jobs are?

MECHELAY: I left NASA, I guess it was in May 1990. I had a job lined up with Rockwell. They wanted me to go work the flight ops part of it. Rockwell was wanting to go—at that time there was some Lockheed support here on site, and Rockwell was essentially trying to

run them out and go take over all that stuff. I went and took a job with them, and we eventually wound up moving the Lockheed guys off the e-tach [phonetic] contract and we brought about ninety-three EP worth of people, of which I hired a bunch of the Lockheed people. We sold that about six or seven years ago, I guess. That's essentially this gist of the people I've got working for me now.

So we do all the engineering support, all the data evaluation, work with MOD in any procedure changes, stuff like that, and work with the Cape and California. So it's really one big engineering team from coast to coast, now Boeing. We've got really experienced people. I didn't look for any fresh-out to-train people. I looked for experienced guys that had been working the system, that had system knowledge to start with. Now we're trying to go replenish some guys. Some of them are getting old. So we're scrounging around to pick up. We're still trying to get some experience—not fresh out, but experienced people.

RUSNAK: If you look back at your career from the beginning to now, what do you feel was the biggest challenge for you?

MECHELAY: Challenge? I think getting the checkout requirements after the fire was probably a big one, because it really was a big unknown doing it. Getting the MER running the first time, for the first flight, the whole team trained was a pretty good challenge. Then pulling this contractor team together, that came with Boeing. That was probably the three things.

The thing I enjoyed most, I think, was after 51L was working the launch commit criteria. That was by far, I think, the most rewarding, fun job I've ever done. For a solid

year we wound up looking at every page of a book and arguing with the whole community and the whole world on what we were going to use to launch with. It was a big learning exercise. Got a lot of people mad at me, but that never bothered me.

RUSNAK: I'd like to also ask you about a few of the memorable moments, looking back, like Apollo 11. Do you remember where you were when they landed?

MECHELAY: Yes. In fact, we stayed here all day. We were over in Building 45 watching a kind of a miserable video, when I look back on it. It was really good.

But I still think the highlight was Apollo 8. That was really significant. Of course, Apollo 11, I remember NASA Road 1 was a zoo, so it really was pretty neat. It's hard to conceive. You've worked—in fact, I often made this comment. There's three times, probably there's more than that now, but there's times in life when the world, when the whole world was together, and that was Apollo 8, Apollo 11, and Apollo 13. The whole world was all tied into those three occasions. It was kind of awesome to know you were in the middle of it.

In fact, a funny incident here just happened last Friday. We had Bring-Your-Kid Day to work here. I went out here and there was a guy that had two little kids with him, two and four, something like that. He'd come up to me, and he says, "That guy helped put man on the Moon." Boy, what a feeling. He said, "Yes, I was nine years old at the time." The dad is saying this to me. [Laughter] Funny.

RUSNAK: I wanted to give Carol and Sandra a chance to ask any questions, if they had any.

MECHELAY: Sure.

BUTLER: Just one. You mentioned that getting the MER up and running and getting the team trained was one of the biggest challenges for you. What did that training entail? You talked a little bit about how the room was set up.

MECHELAY: We had the room. We had a whole bunch of new hardware coming in. Then I had to go get a whole of guys, including the contractor, trained. We had about six, like I say, long-duration sims. So we worked all the procedures up, trained all of them, "This is how we want to work. Here's how you're going to do it." It felt real good, because it went off like gangbusters. It really worked smooth at the end of it. I got a few "atta-boys" from some of the managers for it. In fact, I never really got called down for anything we've done in the MER all these years. It worked. You planned for it, and it worked like a charm. When you do something and people recognize it works—

RUSNAK: Sandra?

JOHNSON: No.

RUSNAK: I'd like to give you a chance to make any final remarks before we close today.

MECHELAY: Well, I've had a lot of fun in my life working this space program. You talked about the highlights. I think the highlight is the people involved in it. There are some really neat people. I've got be pretty friendly with a lot of astronauts, with Chris Kraft and Aaron Cohen, and guys at the Cape, Bob Seek [phonetic], and [Robert L.] Crippen, [John W.] Young. They're just class, class, class people. They all wanted to go do the right thing and get it done.

I've had disagreements with lots of them. I'll give you another funny story. When I was working launch commit criteria, one of the launch commit criteria I wanted to enforce was that when the fire alarm went off, we'd take it down to T-0, and it would stop the launch up until that time. Crippen was heading it up, and he said, "No, I want to go back to ten seconds prior to launch." I argued. I'm a pretty loud arguer, and went after him. He said, "Well, if you want to go over me." I said, "You're crazy. That's it. You don't want to do that, fine by me, because I think you're wrong, absolutely wrong."

Here just about six, eight months ago, I was in an airport with Dick [Richard N.] Richards, who is an ex-astronaut, and we happened to be talking about stuff, and he says, "You were the guy that went and did that." I said, "Yes." He said, "I never understood that either." You know, how it got back on there and it's still that way today, and I says, "Shoot, if that's what you want to do, fine." I could always feel like you could have these arguments with these superheroes and get your point across. That was the end of it. There was nothing personal with it, just technical differences.

The people, there were some really good people in this program, lots of them. They were serious about their jobs, and yet we had a lot of fun with it. There was a lot of competitiveness with it. It's pretty neat.

RUSNAK: That's the great thing about this project is we get to talk to a lot of these wonderful people, the type that you're speaking of.

MECHELAY: Like Arabian. He was a very hard guy to work for. I learned a lot for him, but I was really glad when he left. I didn't have anybody second-guessing me then.

In fact, another funny story. The Approach and Landing Test Program, just before we were going to do the first flight test, we had had a measurement problem on the CPU [central processing unit]. The measurement was really bad. So we get to the Friday before that and saw Don. "Don, I may need your help." We were supposed to fly Tuesday. So Monday I called him over. I said, "Don, come on over here."

So he came over here. I had brought all the people together and I just couldn't get the answer. He came over and browbeat them, and about an hour later he figured out it was an instrumentation problem. Then he proceeded to chew me out for two hours on how dumb I was not to find the problem and, boy, I was livid. I said, "You could chew me out, but I didn't do anything. But I brought you over to solve the problem. I don't deserve to get chewed out." He was a hard guy to work for. I was one of the guys he thought was one of his better people. [Laughter] I would like a list of the people you talked to. I'd like that.

RUSNAK: Sure. Not a problem at all. Well, I'd like to thank you for joining us today.

MECHELAY: I enjoyed it.

[End of interview]