

ORAL HISTORY TRANSCRIPT

RAUL E. "ERNIE" REYES
INTERVIEWED BY CAROL L. BUTLER
TITUSVILLE, FLORIDA – 1 SEPTEMBER 1998

BUTLER: Today is September 1, 1998. This is an interview with Ernie Reyes, in Titusville, Florida. The interviewer is Carol Butler, and this is being done for the Johnson Space Center Oral History Project.

Okay. I think we're all set to go. Thank you for agreeing to do this with us.

REYES: Well, like I said, no problem. I'm still alive to talk to you, so I guess that's better. I wanted to show you a few things that have been written. [Referring to a book] Everybody's aware of the appointment, the Apollo 13 mission. Had some of the key producers and the astronaut in charge give us a call and we assembled a whole bunch of guys, which was the first group of guys to find out what went on with the mission, what was peculiar about it, except, obviously, Ernie Reyes is "Ernie Reyer," in the book, which I don't mind.

But over the years, I've talked to a lot of people because of a lot of things that we've been involved with. One of the things I was involved with, that was very prominent, was the Apollo fire. I was the spacecraft manager on that vehicle, and when the history was written up, I was called on. Since I was the chief of the pre-flight operations branch, I had a lot of testimony and I was basically responsible for getting the vehicle built. The guy that was my partner was [Clarence] Skip Chauvin, and he was responsible for getting it tested.

So all of us looked into the thing. If you look at the very key people involved in the investigation and the process of the fire, a couple of us were involved in that. Years later, we

had another investigation. This was on the *Challenger*. And here again, some of us were very deeply involved. But somewhere along the way, people started writing books. Mr. [Charles] Murray wrote a book [Apollo – The Race to the Moon], and he wrote me a nice letter, and he says, "Ernie, you do it all. You do it all." He wanted to talk to me, and he had a lot of ideas, and I said, "Okay, surely."

So we shared a lot of ideas and he wrote me out a letter, and he said, "Man, you do it all. You do sound effects, you do the noise factors, you know when to pull up the volume, when to pull it down, and you know the story, basically, of who did what to whom." But unfortunately, he wrote to me and said, "We can't write everything in the book, so when you write something, it's a shame that we don't cover it all." And he did say something to that effect in the book, that said, "The work on spacecraft operations got cut brutally short. How can we write about Apollo without talking about all the good guys?"

Nevertheless, there are some of these mines to be mined. I got a call from the folks doing the [HBO] movie, *Earth to the Moon*, and I guess my buddy Doug Lord, who was responsible for the [NASA Spacelab] program and who was the keeper of the NASA meatball, wrote me a very nice thing, and it's something that I'll relate to you later. It's something that happened one night in the Washington area, in a motel, as a matter of fact. We used a bed and we laid out the whole program, and that's the first time that we just don't give managers the credit. They lean heavily on the creative—

BUTLER: Genius.

REYES: Of you know who, and they spelled it right.

BUTLER: They did. That's good.

REYES: I said, "That's wonderful." And all these things are peanut cans and balsa wood and foam, but it was hard to visualize for some of these people how to do things.

But anyway, let's start in the beginning. In the beginning, I got out of school and when I went out of school, I wanted to work on airplanes. I wanted to design, I wanted to work on various aircraft. So I wound up working in Dayton, Ohio. In Dayton, Ohio, when I toured the place, very tragic, the day I walked in as a new engineer hired, they laid off 700 blue-collar people out of the workshops and out of the various places that they did, so we had a chance to work in a variety of offices that were looking for engineers.

So I wound up working with a project that there were some NASA people involved on, called the X-15. That was a rocket ship, it was a research aircraft, that was launched off of a B-52. And the airplane, that's the original model that I built when I was a bachelor, the B-70, that white one up there. So I went to work on the B-70, and I supported the X-15, and I supported a supersonic fighter bomber, B-58, it was called, and had occasion to work on the B-52s, and even had occasion to work in graduate school.

The Air Force needed nuclear engineers, so they rounded up a whole bunch of us folks and sent us to Ohio State to work on nuclear engineering, get our master's in nuclear engineering. We flew a nuclear reactor inside of a B-36, which we flew all over the Southwest, such that, if it ever went down, you wouldn't have to build too big a fence to cover it. Another Roswell, another Area 51. [Laughter]

Anyway, President [John F.] Kennedy one day canceled the program due to funding problems, and from 250-some bombers of the B-70 variety, we were cut down to twelve, then down to four, then eventually down to three. It was a very austere program, and some of my fellow officers, one of them in particular, had gone to join the Manned Space Task Force in Virginia. So one day, these folks, they launched a Redstone rocket with a guy inside of it. That guy was Mr. Shepard, and he went down range fifteen minutes, and I said, "Oh, man. I'm in the wrong place at the wrong time."

So I wrote in a resume, and I wrote what I was doing for the ground support equipment, chasing rocket engines for the X-15 and doing parts and pieces and doing some planning, so I was hired, and I was told to report to Houston, Texas. My wife and I are originally from El Paso, so we both said, "Yea! We're going home to Texas!"

So we reported to the Lane Wells Building in Houston. Houston had been changed from the Manned Space Task Force to the Manned Spacecraft Center in Houston, and it was just like the movies. My God, the Lane Wells Building, designed by Frank Lloyd Wright, was in one of the beautiful neighborhoods. My God, there were guys like myself in white shirts and skinny little ties and suit and pants, jackets, you know, suited guys, really going for a job, there were guys in technician uniforms, there were other guys in t-shirts, they were in Levis, they were in dungarees. They were hauling around sheet metal parts. They were hauling around pieces made out of plastic, that obviously were things to do with rocket ships—rocket motors, parachutes. I mean, they were hauling all this stuff around, and they looked like the set of the movie "The Rocketeer," or something like that. This was exciting.

There were ladies there, and they had piles of letters. I got there, and I gave them my name, and they said, "Okay, you're So-and-so, here's your paperwork, you go with this group,

and go to this place and follow them and then they'll put you to work." We went to a motel, and on the second story of the motel, there were drafting tables and we were laying out some planning, with respect to the Apollo Program.

We changed to another location, and eventually we wound up at the HPC, the Houston Petroleum Center, which was nothing more than an oil derrick on the side of the Gulf Reef Freeway, going to Galveston from Houston, a cemetery on both sides, and in this office complex, the Gemini folks, under the leadership of Kenny [Kenneth S.] Kleinknecht, were on one side of the complex, and the Apollo folks were on the other side, working for a guy named Joe [Joseph F.] Shea. So I worked for the Joe Shea side of the house, but I supported the Gemini Program with the planning going on.

Then we moved out of there to a shopping center, and it was wild and woolly. This shopping center, it was more like an office building, but this time we looked at some hardware and we decided, "Hey, this is going to be where we're going to evaluate the launch vehicles for the oncoming program."

For the Mercury capsule, we had Little Joe I that we launched at Wallops [Island, Virginia]. For the Apollo Program we were going to build the Little Joe II, it was called, and we were going to put a capsule on top and shoot it up, and go to Max Q. That's the maximum pressure that you can exert on a spacecraft, and there we would eject the escape system, man-rate the escape system, the rocket motors and stuff, and man-rate the parachute systems, etc. So that's what was going on.

We reviewed all the various proposals, and one day somebody came by and said, "Hey, we need somebody to go out to White Sands, out in the desert, out in that horrible place called the desert Southwest. The horrible place is right outside Las Cruces, New

Mexico, and that's where they used to use V-2 rockets and it's an Army test facility and that's where NASA's going." All of us were, "Wait a minute, we were going to do the pad aborts off of the pad at the Cape, and we were going to do the engine testing at Eglin Air Force Base. What happened?"

Well, what happens is, politics happens. The delegation and the Appropriations Committee in the Congress was led by Clinton Anderson, the honorable senator from the state of New Mexico. Guess where we wound up? We got eighty square miles of New Mexico, wirgin territory—I call it wirgin —because it was, it was wild and woolly and there were black bears in the mountains, and out of that place, we were supposed to level out a place and build a place, and build some test stands to test the lunar module engines under vacuum.

That means that we had to build some altitude chambers and...[establish] the vacuum, then start the engines and make sure they're going to work in the vacuum. We didn't have any such facility anywhere else in the United States. So we got that. Plus, in addition, for a pad abort and everything else, we got the ALA-3, Army Launch Area Number Three, which was thirteen miles from the base at White Sands, which was forty miles from El Paso, and it was the old pad that [Wernher] von Braun and his outfit had put together right after the war. It was a blockhouse that was very small, that was built to the metric system, and we shared that with another Army project, and they called their vehicle the "ARPAT."

What they were doing is, they were shooting warheads on Honest John boosters [into the range], and then when they re-entered, the Army would try...—with the other technology they had—to shoot them down, the start of the Star Wars things. So they were shooting

incoming ICBMs and there we were [sharing a launch pad], and we had to scratch out a pad and give birth to a location.

So I said, "Well, I'll go. I mean, it's really bad, but I'll go." Well, hell, El Paso was my home town. I grew up in those desert hills. I grew up shooting lizards around there. So the wife and I went to El Paso. I was the permanent employee there. I was a GS-9, I think, and the manager was one of the big managers, Wes Messing, from Houston, and he would fly out there once or twice a day. I always said that he couldn't sleep at night unless he had flown the Continental Airlines to Houston, or back and forth.

But we cut a deal with the Army and I negotiated with the Army for the real estate, the land, the trailer, all the brick and mortar items. We laid out some drawings. We got an old Army barracks and we converted it, and we started hiring people. I mean, people wanted to go to NASA. NASA was an exciting place. We hired all of six NASA engineers. We hired Mr. Skip Chauvin from the Hawk Program, who was later to become our chief test conductor at the Kennedy Space Center.

We hired five other guys that were actively involved there. One was actively involved with the Range, and he knew about telemetry and the IRIG. I-R-I-G. IRIG, yes, all the instrumentation standards and everything else. We hired a guy to help us with construction. He had been with the [U.S. Army] Corps of Engineers. He was a [construction] builder and an Army guy. Then we hired a buddy of mine who had gone to Texas Western. He was top man in his class, electrical engineer, Manny Gonzalez. And we hired a guy named George Clegg [phonetic]. He was an Army operations guy.

So all six of us went out, and in 180 days we built a pad, we built the first vehicle assembly building, the VAB, and it was [for] doing the weight and balance on the Apollo

capsules, to put together the boilerplate [capsules], to handle the solid rocket motors, and to basically...[support] the pad abort test done there as well the Little Joe II.

The pad abort test was one where we got the capsule ready and we loaded the parachutes. We put a launch escape system...[on the capsule] and we fired it. It went up exactly one mile, and then the parachutes came out.... The launch escape rocket took it up and moved it over, and then the parachutes came out and then the capsule came down and [landed] about a mile down range. We went out and picked up the...[capsule and parachutes], brought...[them] back, checked it all out and [started] everything...[all over again].

So we built this processing facility. We built the whole hangar complex and everything else off of the Army launch area number three there, had a big old NASA meatball, we put it on there, and that became our first VAB. ...[The Apollo] guys hadn't started here in Florida on that, but we were way ahead of them over there, launching Apollo boilerplates and capsules.

Along the way, we got a fellow from the [Cape,] hangar S over here by the name of Welby Risler. He became our chief engineer. He was a professor at FIT [Florida Institute of Technology]. At the same time he was one superb technical individual. He became our boss, and he would have little chats with us and tell us how we were supposed to do business and everything else, and we're out there building, pouring concrete, pulling cables, and running to El Paso, putting extra terminals on batteries, paying out of our own money. I used to write my own personal checks to get some work done there.

We were hauling back and forth, and then one day this gentleman by the name of Walt [Walter C.] Williams, Walt Williams was the head of the high-speed test facility at

Edwards, and prior to that he had been in Florida at Castlebury, where they had a high-speed test facility and bombing range, and he was of the old NACA [National Advisory Committee for Aeronautics] guy. Mr. Walt Williams was a flight director at Houston, flight dynamics officer, and everything else. He was a brilliant individual. I've never heard a man cuss worse than him, ever in my life, but that's another story.

He came over there, he sat us all down, he says, "What do you do? What do you do? What do you do?" He went around to all six of us, says, "Okay, what do you do?" "Well, I do this." "You got any explosives [experience]?" "Well, I'm in the Army Reserve National Guard, and I've used C-4, I've blown up tanks, I've driven tanks, I've...[launched] Honest Johns, I know how to do munitions and fuses and proximity, [fuses,] this and that." He said, "Good. You'll do pyrotechnics and you do explosives, you do the rocket motors, you do the weight and balance, you do the parachutes. Besides that, you also become the mechanical engineer and do structures." I said, "All of that?" I was wondering what I was going to do with my spare time.

He went to the next guy, he says, "What are you?" He says, "I'm an electrical." He says, "Good. You do sequencers, you do sequences, you do the EPS, electrical power systems. You do this, you do this."

Skip Chauvin. "Okay, what? You worked on the Hawk missile, you do this. Okay, you can be the test conductor, write the procedures, run the procedures, head the test team."

I mean, in one two-hour session, he went up there and he assigned us all what we were to become the rest of our lives. We had built a facility, now we were going to be a launch team.

He hired a guy from Convair, who had worked over here on the Atlas, and he had been the man that would get the Atlases all ready to go. He had been the man to get John [H.] Glenn's [Jr.] flight ready, except he was third shift, and when third shift went home, first shift would come in, they would take over and they would do the launching and they would do all this stuff, and the guys on third and second never got anything.

So NASA hired this individual, and they told him to go out there and shape us up into a test team, so this particular gentleman shows up there and called us to order and started telling us how to be professionals and act like professionals and do a job. His name was George Page. G.F.P, George F. Page. George is one of the finest individuals that you'll never read a book about, but he was the chief test conductor for us out there, showed us all how to do things.

Later on, [when] he came over...[to Florida], he became the NASA chief test conductor, he was in charge of the pre-flight operations group, and when you look at all spacecraft operations in Florida, he did all the [ops] work for a guy named John Williams, who reported to G. Merritt Preston. George did all the operations. A guy named [George T.] Ted Sasseen did the engineering. A guy named [Joe] Bobick did the quality [control]. So that was the first time that George was hired by NASA and he went out there to White Sands.

So anyway, at White Sands, they said, "Well, okay, you're going to do this, you're going to do that. You need to know about rocket motors," so they sent me to the aerojet rocket motor plant in Sacramento, California, and they sent me to another school in Maryland, with Thiokol, at Elkton, Maryland, and I became one of NASA's trainees, proteges, whatever. [At these early years] we grew our own [expertise].

We got our hands dirty. They had me out there [at Aerojet] like a Mexican laborer, with a cloth around my neck, sitting up there on top of a rocket motor, which was upside down, and we were in the shade, we were down to our shorts or cut-offs, and we were shaving propellant, with a knife, off the rocket motors. That's how we used to fit nozzles into the...[motor casing]. We did it by hand, carving the propellant and putting it in [a] water [bucket], and then we went through the mixing plants and we [trained and] worked such that if anything went wrong, we went down this fire pole and we evacuated. [Tape recorder malfunction.]

[REYES: The caliber of the people that we had working for NASA at this time was outstanding. One day at WSMR (White Sands Missile Range), our boss, Welby Risler, was reviewing our progress on the construction and checkout of our launch facility at White Sands when we got a call from the cape. The call was for Welby.

After some discussion, Welby went to his stack of cardboard mailing tubes and pulled out an electrical schematic.

"Have him throw this switch," Welby said. "Ok, now tell him to wiggle this harness." "Now tell him to move his right leg up—as much as the capsule space will allow." "Now on signal conditioner number [xxxx] you guys in Mission Control look at measurement number [xxxx] as he slaps his leg." "Yep, I know what the problem is. Tell him to disconnect his biomedical harness at the right leg disconnect and the spacecraft measurement will become rock steady." "OK." "Not a problem." "Any time." "OK." "Good luck."

Welby turned around without skipping a beat and said, "Where were we?" I said, "Wait a minute. Welby, what was that all about?" "Oh, nothing serious. Just a minor glitch on a spacecraft measurement."

After an explanation it appears that there was a Mercury capsule in space and one of the spacecraft measurements started giving out strange readouts, so the Missions Control at the Cape called Welby at WSMR. What Welby did was troubleshoot the problem, using his electrical schematic, and by asking the astronaut in space to perform certain tasks and by requesting Mission Control to monitor certain functions. Welby solved an inflight problem. The problem was that an onboard signal conditioner was processing both a biomedical sensor (on the astronaut) and a Mercury systems measurement. Because of moisture on the astronaut's leg and crosstalk on the measurements, a possible serious concern was explained away and the flight proceeded without incident.

I asked Welby "Does this happen all the time?" "Oh no, but I like to carry my [blue] prints with me just in case." Talk about gaining more respect, Wow. After this episode—when Welby talked we listened harder.]

[BUTLER: Really shows how important everyone is to making it all happen.]

BUTLER: I'm going to keep this [referring to the tape recorder].

REYES: That'll be your job, periodically, to glance down at it.

[BUTLER: Mr. Reyes also recounted a story about how not everyone at NASA was as competent as everyone else. Mr. Reyes and some of his co-workers were out wiring up a rocket when a gentleman from Johnson Space Center came down and tried to tell them that they were doing it wrong. Mr. Reyes and his team protested and said they would not do it in that manner. This gentleman was insistent and the matter was brought up to Sigurd Sjoberg who was in charge of the group out there.]

REYES: "So anyway, do we worry about AC/DC?" and the guy says, "Oh, no, you just worry about DC. That's the only thing that'll set off the ordnance." And the guy says, "Wait a minute, guy. When you put a piece of toast in the toaster, it burns it, right?" "Yeah." "I mean, the element glows red, right?" "Absolutely." "And you toast bread, right? Okay." "When the ordnance device starts up and the element glows red, that sets off the explosives. If you look at a chart, direct current goes straight up and you set it off. If you look at alternating current, it goes up, then comes down, then goes up, but when it's going up and it hits this point, it's going to go off, so you have to worry about AC." "Oh, well, no. We never do." I said, "Well, God, I'm worried about you."

So my boss lost technical competence in this individual who was out there helping us, and he said, after that episode, he didn't have any respect for the guy, but he didn't know how to get rid of him. So Sig [Sigurd A.] Sjoberg did a great thing in asking the guy to leave, and that was good. I'm glad he did.

So we processed many launches, Little Joe II [launches], as we called them, and Apollo pad aborts. We hired some people that went on to be good contributors toward the program, and at the same time, every time we had a flight, we had new astronauts would

come out there and see the hardware...this is where we had the Apollo hardware, was at White Sands, and [the group] wasn't very large. It was six [NASA] engineers, thirty-five Convair people and about twenty-five North American Aviation people. And we had [our] facility that was thirteen miles from the [WSMR] headquarters, and then the [WSMR] headquarters was forty miles from El Paso.

One day I had occasion, that we had platforms up and we were putting these [Apollo parachute] mortars with the explosives and the parachute slugs and everything else, and if one of these inadvertently goes off, it'll break your legs, it'll knock your legs off. So I said to this buddy of mine, his name was Gil Good, we had hired him from Challenger Labs, he eventually became a manager at Houston for logistics, Gil Good, I said, "Okay, Gil, I want to see only so many legs up here. If somebody's got a peg leg, that's okay, but we are only allowed so many people out here. So you count the legs and divide by two, and that's how many people are allowed out here and no more, no less, and I don't care who it is, you don't let them down there." So he says, "Okay, Ernie."

So I got in the Jeep, and I went up to headquarters and I was talking to either Wes Messing or my boss, Welby, on something or other, and I get a phone call, and it was a security guy, and then they called Welby and then they called what's-his-name, my boss, Wes Messing, and they said, "Oh, Ernie, your boy Gil just did it."

I said, "What did he do?"

"He said there were some people out there who came down on a tour and they were up there touring, and he went up there and says, 'Okay, we've got too many legs up here. Some of you guys are going to have get off because it's not safe. There's a placard for so many people here, so the rest of you either get out or we're stopping everything.'"

So sure enough, they got down, and then they got up there one at a time, and then they came all down. And Gil called me. He said, "Ernie, I did what you told me."

I said, "Well, you did well."

And then my bosses called me in, they said, "You know what your boy just did?"

I said, "He followed his orders, and we try to keep it safe. Now tell me what we did."

"Well, you're right, technically, but politically, when Dr. [Robert R.] Gilruth, and Senator So-and-so, and such and such administrator come down from NASA headquarters, and with a political delegation and the Manned Spacecraft Center chief, Dr. Gilruth, come down here, you let them look."

I said, "What did he do?"

He said, "He ran them all off."

I said, "Oh, God."

But afterwards, Dr. Gilruth told the boss, "Hey, the guy was doing his job. I'm glad he's doing his job. We want to be safe, we don't want to have an accident." But my God, you know, it was hard to tell. Gil didn't know Dr. Gilruth from anybody else, and we didn't know that he was there. Otherwise, we'd have...[put on] a show. But we never had time to...[put on] a show. We were doing [the required] work and if they wanted to come in and look, they came in and looked.

So anyway, my career ended there, because after a series of shots, one of the gentleman that was in charge of operations for Florida operations, a guy by the name of Paul Donnelly, who had been George's boss, George Page's boss, said, "Ernie, you're wasted here. You need to come with us. Your talents are needed at the Cape."

I said, "Do I get to be a Cape crusader and say, 'That's not how we do it at the Cape'?"

He says, "Yep, you do." I said, "Okay."

So we came to Florida in '64. We looked around and we were going to be beach bums and have a good time, but everything was really not quite right. We lived on Merritt Island. We couldn't see cross the street because of the traffic. It was like Coney Island. We went to church at a movie house. They used to have Catholic services, Protestant services, and Jewish services. It was called the Old Barn Theater. Can you imagine that? You didn't have a library. You had a hospital there. But, hey, we were a young family, we were the huppy yuppies, or guppies, whatever we were called.

This was 1964 and we were going to the moon, we were working on [the lunar] program. So we went to live on Cocoa Beach, then on Merritt Island. Then one day my two-year-old daughter got sick. Took her to the hospital and they didn't have a doctor. It was at night and I said, "Wait a minute. The definition of a hospital is a place that you have a doctor." Well, they didn't. You had to use a telephone.

So the next day—I was second shift—we came [up to Titusville] and bought a house that had sidewalks so my kid could ride a bike, we had a hospital, we had a Catholic church, had a library, and it didn't take long for us to settle in on the fact that we were raising a family and Cocoa Beach or Merritt Island, it just didn't have some of the things that we needed as a family.

I went to work here [at the Cape] and the first...[assignment] I got was [working on] an Apollo boilerplate [capsule] on a Saturn I-B—which was very different than Little Joe II. In those days, we could go all the way up to PlayLinda Beach and we could see a rocket about three or four blocks away and watch the liftoff...go. We were going to launch a boilerplate, and I was an operations engineer, I was hired to go there, and I was second shift.

One thing I noticed about Florida, we had a lot of people standing around and very few people doing actual work. There were inspectors and logistics and operations, and statusers of statuses, and we just had people on top of people. You had Chrysler people, you had Bendix people, you had Pan-American people, you had NASA people. We were on the Air Force side, so we had an overlaying of Air Force people to monitor what we did and everything else, and it was just most difficult to get things done and I said, "Oh, goodness."

So I tolerated as much as I could, and about the third night, I said, "Okay, guys. If you people don't do this, then I'm going to." And I picked up a wrench and I went on there to mate the launch escape tower—with a [live rocket] motor—onto Apollo capsule, same things we had done at White Sands [several times].

The technician chief said, "You can't do that. You're an engineer. You're not supposed to handle tools."

I said, "I've been here three days, and we haven't done a lick of work, guys. Now, this is all that's required." [Referring to a notebook with pictures.]

"Oh, what is that?"

I said, "It's the boilerplate [capsules] we did at White Sands. We did six of these before, you guys. This is your first one."

"Oh, you've done this before?"

"Absolutely."

"Oh, well, we'll follow your lead. If you've done it, we'll follow you. Tell us what to do."

So I'm directing, "Okay, make this, safety-wire that, put this, do a megger check, check the wires here. Okay, let's clear the people now. This is unsafe."

This one particular gentleman, he was off in a corner, and I said, "Who's this gentleman here, over there?"

They said, "Oh, he's a NASA inspector. He's quality."

I said, "Hey, come on! The party's over here. Come on, get over here. Listen, this is what we're going to do, and this is where we want you to bug off [(stamp)] on the edge of the page where your stamp's supposed to be."

So he said, "Well, you know, I'm not that familiar." I said, "None of these guys are, but we're all learning, so if you'll bear with us, we'll go."

So pretty soon, he takes off and another guy comes on. Evidently, spacecraft inspectors had three or four, and they spent their time in the trailer and they came up there and looked, then they went away, and the space vehicle where we were, we had two or three or four inspectors per shift. The booster had one inspector and they looked at various things and then they went away. They relied more on our contractors.

So I said, "Well, hey, this isn't working. Hey, guy, listen. You're the square wheel on this wagon. You're not helping us. You're not bringing anything to the party, you're supposed to be part of it, so when we get done, we're ready and it's stamp as you go, close out as you go, and when we get done, we turn the page, you stamp it and we're complete, and we're all happy that it's done to the prints."

So we had words, and finally I got a little ticked off at the guy...[Note:]—we had bought this house and the guy who sold me the house had assured me that they had never, ever had a hurricane. Within a month of buying this house, we had a hurricane go between Daytona and here and Melbourne. And all it did was a west Texas sandstorm with water, but it brought out all these little frogs, and every time my wife would leave the front door, the

little frogs would jump with their little suction cups, and she was terrified of these little frogs—

So I said, "Listen, pal," to this quality guy, "you are nothing but a toad. You're a frog. All you do is you eat and you poop. You don't contribute. You ain't helping us. You're a frog." Oh, the technicians, they loved it. In those days, we all had names. A mullet was a technician, a shark was an ops engineer, a pelican was this, and we had all had key names for various people, and I called him a frog and he got all huffy and he took off. And I said, "Oh, God, I'm in trouble."

His supervisor comes up, and I could tell he was a supervisor because he had a white shirt and a bow tie, and he was tall and big. And I said, "Oh, Lord, he's going to kill me." And he came up and all the technicians gathered around and said, "Oh, there's going to be some stuff here!" So the guy says, "Who is Reyes?"

I said, "I'm Reyes."

He says, "You insulted my inspector. You called him a frog."

I said, "Listen, the work's over here. He can't follow the work by being over there [in the corner], or not being here. We're working as a team, and we're supposed to be a team, and I insist that we...[move on], because that's the way it's got to be. It's one thing after the other after the other, and [we] can't sit around and wait, and he's either part of the team or he's not needed. If he's needed, he's got a place, or he's got to bug it off and he's got to go. And right now he's not contributing. I told him he was a frog because all...[he] did was...[eat] and...[poop], and he...[wasn't contributing toward the job at hand]."

"Oh, Ernie, you called him a frog!" he says. "Well, I'm here to tell you that that man has more time in the chow line than you have in the service of our country," this and that, this

and that, and this and that. And I said, "Oh, God, I've got to stop this. This is ridiculous." I said, "You're right, I'm sorry. He's not a frog. He's a toad. One of these days, he'll be a good little froggie," and I walked away.

Oh, my God. That was in 1964, and all the technicians started calling inspectors frogs. An inspector at Kennedy Space Center was a frog, and I mean, it spread like wildfire. "Hey, we need a frog over here." So froggies was the name of it. But after a while, then some of my good friends, who were inspectors, they started having little frogs on their desks and things like that. It was just like pig party, you know, with the pigs and the police and everything, so they didn't mind being called frogs and toads and everything else, but for years, a frog was a NASA quality guy.

When I got to be director of quality [at Kennedy Space Center], oh, God, payback is hell. I got to be director of Quality [Assurance], and I received envelopes, packages with stuffed frogs, inflatable frogs, plastic frogs, frog cartoons, and everything else. And they said, "What goes around comes around, Ernie." But I invented that little froggie situation, and it was just one those things.

But anyway, it was neat. Everybody was enthused about their job. The agency had nothing but good people. We had the best of the best. We weren't very large. I think there were forty, maybe fifty of us, at hangar S, and we worked out of hangar S, and then one day they decided, the powers-that-be, that Merritt Island was going to be the place, and we laid out a building and we built the board and storage facility first. It's called the VPF now, the Vertical Processing Facility, and we did the [pyrotechnics]—explosives—we did the ejection seats for the Gemini [capsules] and things like that, because while we were...[testing] Apollo

boilerplates [at WSMR and at the Cape] and firing them on Saturn 1Bs, the other program in St. Louis...[starting up], which was the Gemini Program.

So after about the fourth week here [at the Cape], working through this kind of environment, I went to my bosses and said, "I quit. My father works for a living, my brother works for a living, I'd like to feel that I work for a living, and I'm not happy here. I'm not used to this kind of activity, [six people looking and one person working]."

So they said, "Well, Ernie, we're going to help you. We're going to ship you where they've got some capsules," and this, that and everything else, so they sent me on a one-way trip to St. Louis.

The Gemini line was working, and I became king of the night shift. From ten o'clock at night till eight in the morning, I was the NASA guy, and there were no other NASA guys. All I had was a phone list, and if I needed help, I called a particular discipline [a system engineer] or I called an astronaut. They were staying in various places.

We had Gemini II, III, IV. They were all in line, being built, built with the insulation blankets, the protective things with the panels, with the environmental control system, the rendezvous radar systems, all these good things were being assembled. So consequently, I had a lot of interfaces with the McDonnell people...

We had the NASA Cape guys. We had a team that went from Florida here, and they lived up there and checked out the capsule and brought it back. That's how the Mercury team had worked. Well, this was good enough for Mercury, it's good enough for Gemini. So we had a Gemini lead guy from NASA and then you had somebody on second and somebody on third.

I was the third-shift guy to take care of all these things, and that's my first meeting with Mr. John [W.] Young and Gus [Virgil I.] Grissom... I'm out there, I think it's two in the morning, and we were trying to do this and that and everything else. The Soviets had just gone EVA [Extravehicular Activity] and we were trying to see if we could open up the hatch and go EVA on the Gemini capsule, but the capsule on Gemini capsule number two was warped, so you needed about three guys on the outside, so it was not possible to go EVA on that.

John Young, rookie, shows up, and Gus Grissom shows up, and they said, "Well, who are you?"

I said, "Well, I'm this, this and that, and this is my job and I'm watching these capsules and I'm the operations folk, I'm the engineering folk, I'm the NASA guy on this shift."

He says, "Well, Ernie, we came down here because we want to check all these things," and they gave me a clipboard with all the things they wanted to check.

I said, "Well, this isn't ready, this isn't ready. All these things aren't working. They won't be ready for another day and a half."

He said, "Well, here's our motel number at the St. Louis Motel. Give us a call when you're ready."

But before he could finish, John Young jumped in the capsule. The Gemini craft is a two-person...[capsule], and we were working the O₂ demand valve, such that you could get O₂ demand oxygen into your suit. It was tough. It was a dry lube problem and you couldn't move it. And he's in there, finally gets up and puts his foot on it and—boomp!—he makes it

work. And he says, "Gus! Gus! I can make it work! I can make it work! It's okay, we can fly like this. I'm ready."

And I'm shaking my head and rolling my eyes, and Gus Grissom looks at me and he puts his hand on John and says, "Come on, John. Let them work it." He said, "Ernie, give us a call when it's ready."

I said, "I'll give you a call when it's ready. No problem, Gus." That was my first meeting with John. John Young and I date back. We're old friends since then.

But as you tell stories and as you remember them, I've got a basic problem that I remember everything and in detail. I remember things that people shouldn't remember. I remember Pearl Harbor, I remember VE Day, victory over Europe. I remember those things, even those when I was a small child, I remember the impact of those things that were going on, and I remember the observances. And when I tell John the story, he says, "Aw, it wasn't like that."

As astronauts become famous and become renowned, they forget their beginnings. They forget those. So I always call him "rookie." "Hey, rookie, how you doing?" I had occasion to work for John Young and [Robert L.] Crippen on their first shuttle. I was tile chief and when they showed up, he showed up again, and I said, "How are you doing, rookie?"

He says, "How you doing, Ernie?"

I said, "Ship's almost ready, but I ain't going to let you climb in and put your foot on any controls."

He said, "Dang, you don't forget anything, do you?"

I said, "No, sir, I don't."

But Gemini was an excellent experience. We got to do a lot of things, and we got to do a lot of innovative checkout methods. We brought the capsules down here and we had a good show, you might say, with all the ships. They were all great ships. The people did a great job in St. Louis, the NASA teams that went to check them out. That concept worked. It worked so good that NASA kept that in the back of their head, and every other program that we had ever worked, we always send a few people from here to there, to check it out and bring it back, and that's what I got on my list in here.

So we did the plant acceptance, we did the processing, and everything was hunky-dory. There was only one thing with the Gemini Program, and that was the escape system. You had a tremendous escape system once the ship was flying. The ejection seats, the doors opened, they pulled a D-ring like a military aircraft. The doors go open and the ejection seats fly out, and I did the weight balance on all the suits and all the folks in the building, the PIB [Pyrotechnic Installation Building], as [we] called it.

So we had to shave their heels [on their boots], and I've got pictures of all of this, so they would fit in the ejection seats, so when they...[flew] out, they [would] stay in one piece, and...[wouldn't] get flung out and everything else. But the problem is, if you have a problem on the pad, the seats are pointed this way, so if you fire the seat while you're sitting on the pad, you get shot into the ground. You don't get shot up, and the parachutes open. You get shot straight down and you hit the dirt. Not a very well thought-out process... Everything was related to flight processing, not much thought given to what happens if we have a problem and they're on a pad kind of situation.

One of the things that happened, Gemini's mission 76 is very famous. We took one capsule and we checked it out and then we went to launch it and it burped, it didn't fire right,

so we just took the capsule, put it in the [PIB] building, didn't touch it. It had been checked out and everything else.

We took the next capsule and we got it ready, we launched it, we took the next [capsule] as the...[#7 capsule] was launching. The thing was on its way to the pad. We erected the second one, the same launch pad, put up a new launch vehicle, mated it to capsule, checked it on and launched it, and while one was in orbit, the other came up there. You see pictures of mission 76 where they're meeting, and they're rendezvousing and they did all that good thing, all of that because of an accident that we had...[when] the engine didn't fire.

And everybody said, "Man, that crew was really cool." They were. The crews were really cool, but they also knew that if they pulled the ejection seats, they'd go right into the ground. So one of the very basic things that we did for crew escape the day before launch, or whatever, we went out there, and what do you do when you can't provide any protection? Do you build a trapezoid, with netting all the way around it? That's not even possible. It won't take the load.

So we took some tractors out there with the disks and we plowed up the dirt. You fluffed up the dirt. What else can you do? My God, what else can you do? And some of the things that had happened is, as the crews came down there, they would get fitted. We would fit them with the harnesses and everything else. Some of the guys picked up a little weight. One particular gentleman, and I won't give you his name, but he would take his procedures and go down to the Alamo [—a Mexican restaurant down the highway from Cocoa Beach—] and eat tostados and chili while he was...[reviewing] the procedures. And a lot of us study that way, you know. You absorb data or you think clearly as you're munching on something.

Well, this guy munched himself through several bags of Doritos and dip and everything else, so when the time came, we were ready to launch him but his harness wouldn't buckle. He was too fat. He got too heavy.

So we had to go build new harnesses for him and everything else, and it was one of those things where you got to do what you got to do. A guy named Tom Otsman, who eventually became an associate for NASA up there in Washington, DC, and eventually became one of the directors of in-station support, he was an engineer and his prime thing in life [at that time, was that] he owned the sewing machines.

So I went looking for him and I...[went] in there with a harness, and I said, "Got to have, got to have a harness like this, got to have it right now, got to go build it right now. Here are the dimensions, let's go do it."

So all the proper bureaucrats said, "Well, you got to fill out the forms, you got to do this, you got to do that."

And I said, "No, ain't got time for that, ain't got time. Who's the boss? I need to talk to the boss."

So I talked to Tom, I said, "Tom, here's the problem. The guy ate too many Doritos. He's too heavy. I need a harness now."

He says, "What do you need?"

"I need a duplicate of this and I've got all the dimensions and we need to go do it right now."

He says, "Follow me." We went in there, we built the harnesses for the guy and another, and these were...[the escape harnesses for Pad 19]. You had a slide wire, you went out there, you hooked on, you jumped off, and you slid all the way to safety.

And so we built a harness, we went on there, we fitted it, fit it on the guy and I thanked the guy. I said, "Tom, I don't how in the world I can thank you, but I'll find a way one of these years." Tom became one of the leaders out there and he was always a helpful person, but he was always one of the many, many NASAs that we had in the way that would say, "Let's do that and let's do it and whatever it takes, we'll write the paper, we'll do whatever it takes, but let's get this job done."

The Marines had a thing that says they were looking for a few good men, and fortunately, for NASA, we always had a few good men, both at the top that would give us the direction and especially at the bottom, where the rubber hits the road, to get things done. So I have a lot of remembrances, a lot of memories with a lot of key people, that allowed us to get key things done. If we didn't have a harness, you can't go out there and subject...[an astronaut] to a launch environment, because he doesn't have a safety...[harness], and if you don't get this, etc., etc. So you've got to cut to the bone, get to the quick, get the thing built and put it in place.

So we flew things on jet airplanes from here to L.A., or Bethpage, with tickets for hardware that was sitting in a seat and we'd go and pick it up and we'd bring it back and we were always hustling. The whole Gemini program, I was working second and third shift because a guy from McDonnell-Douglas and myself, we would put in all the eighty-three [pyrotechnic] cartridges required at the pad, and we would put in the...[pyrotechnics] at night, or on weekends, we'd put the parachutes at night, and we'd do all the dangerous stuff either at night or on the weekends, so I never saw daylight out there. It was always night for me for that particular program. But it was fun and a lot of friendships were made with a lot

of the key guys. You get to know a variety of astronauts called a "red shirt." Have you ever heard that, a red shirt?

BUTLER: I heard it, but I don't remember the reference.

REYES: Okay. You're going to fly. You're the prime person. And you've got a backup crew, and the backup crew goes through all the testing that you go through. Then they've got some want-to-be astronauts who are just either in training, or they don't have a flight selected or whatever, and they become "red shirts." They go out there at night, they throw switches for you, they go chase parts for you, they go and sit in in design reviews, they fly across the country to evaluate something and come back and report to the prime crew. They're the gophers for the first and second crew, for the primary and backup crew, and they do whatever is required.

So a lot of the people that we got to know were red shirts, or I call them wannabe astronauts. They were on third shift. When everybody's sleeping, we're out there doing this work and we're fitting this couch or we're fitting this hand controller or we're doing something specifically for a crew interface, but we don't have a crew interface other than this particular red shirt person. So a red shirt is a gopher for first and second shift, or for first and second teams.

I got done with the Gemini, and by that time the boilerplates were done and we were building the first airframes, Apollo capsules. So they picked a whole team of us and they sent us to California. And then they weren't ready so they brought us back...[The second time they said "We're ready," I got the family ready and we said, "Let's go. We'll drive our

Volkswagen. We've got one daughter and one that's just been born. She's tiny but we can make it in a Volkswagen."

Well, we got there, and we were supposed to be there for two weeks, and...[some of us stayed] for four months, on the first airframe Apollo. And we did a lot of innovative things, and as you do more things, you get better known, or you get a notoriety for doing this, that, or something. I guess my notoriety is that I got to work with people and I was willing to go that extra yard. "What do you need? How can I help you? I'm here to help you. How can I help you?"

A lot of people would go in various places and say, "Where's my desk? Where's my parking space? Bring me something important to sign. Here I am." And I would show up and say, "Hey, I'm assigned to this thing. I'm here to see if I can help you with this, so how can I help you? Can I help you with a procedure? Can I help you through the design, or can I help you with whatever you need? How can we do things [easier]?"

So I showed up with that same attitude on airframe nine, in L.A., and they were having all kinds of development problems. The heat shields had never been fit. You had a whole crew from Massachusetts. Here's this honeycomb structure and they're filling each and every little void of the honeycomb with resin, and they're doing this over there, and they're doing this over there.

The first thing they got is, "Well, we got to do some weight and balance. We don't know. We think we do this, or do that. You got any experience with...[load] cells?"

Yeah, I used to do...[load] cells. You put them down, you get a reading, you rotate them, you get another reading, you rotate them three times and you get three readings, then you get the root mean square value of all of them, and you've got a basic true...[reading].

Now if you want to, though, you can pick it up by a single point, and there are various ways we can do it, guys."

"Oh, we like this idea."

So we started thinking of ways to do weight and balance on a capsule, and then they said, "Oh, by the way, we're going to do a big vibration test on this capsule and it's the first of its kind and we've got to do this and we've got to do that."

And we're sitting there. I said, "My goodness. You're going to vibrate it?"

"Yeah." Because vibration is the worst thing of any flight and you've seen all these things.

So the day comes and they get the capsule and it's all...[ready, however] it doesn't have a heat shield. They get it ready, and then they're saying, "Okay, we're vibrating first thing in the morning."

I said, "Oh, we'll get there, bright-eyed and bushy-tailed." [makes humming noise] I said, "Well, when are we going to vibrate it?"

"Well, it's undergoing vibration now."

I said, "That hum? That little bit of a hmmmmm? That's it? Hey, I'm talking about a [makes a loud vibrating noise]. Let's vibrate this rascal."

"Oh, no, no, no, no, no, no. Here's our order of magnitude."

"Oh, man, we're faking it. We're wasting time. This is ridiculous. You get more vibration on the shipment between here and Florida than this. This is nothing. Guys, when they take off, they vibrate, they shake."

"Well, no, we don't want to do that." Very conservative shake, rattle and roll.

Okay. They put the heat shield on. It's thicker on one side than the other, but here's a capsule, you put the heat shield on in sections, you tie it all in, and here's the platform that goes all the way around it, so you can walk and get over onto it, and everything in that checkout facility is completely white, white as white can be. Oh, boy. "Okay, hook up the sling, we're going to go pick it up."

"Okay, here we are, it's four in the afternoon, let's go."

"What do you mean it doesn't fit? You're kidding."

So I go out there with this guy named Dick Nolan, Richard Nolan. He was the airframe guy for Rockwell and myself, and they're doing one of these, you know, "What the hell's the problem?" He says, "Oh, man, we built the capsule, we put the heat shield, the circular platform is all plate steel and it's about that close to it, and it's all right, but when you start lifting it up, it doesn't clear. "We have built a boat in a basement and we can't get it out." We've got this capsule that's got to go over there, and then it's got to get ready for shipment and we can't even get it out of this thing it's sitting on. Oh, my God, what are we going to do? Jesus, we've got to get some engineers, we've got to get some drawings, we've got to do this, we've got to do that."

And I looked at it, my buddy looked at it, and I said, "Oh, Jesus Christ." And everybody just goes off, and everybody's, "Oh, Lord. Oh, Lord." And the senior managers hear about it, and they come and they look and they said, "Damn! [makes grumbling noises]," and they walk away.

And I went and looked at it, and I went downstairs and looked at all the support structure, and looked at how the beams are all structured onto the floor, and then I said, "Jack, I've got an idea."

He says, "What is it, Ernie?"

"If we unbolt that girder right there, it's got four big bolts and a lot of paint, but unbolt that girder and we get it up here and unbolt it, and then we can just swing that one back and we can get enough clearance and we can get that thing right out."

"Yeah, Ernie, except that ring of steel."

I said, "Well, look here. You see this?"

"Yeah."

"There's nothing here, and there's nothing on this side. Everywhere else there are cables and stuff all over it." I said, "What do you want to do with this? Cut it."

He said, "Ernie, it's structural steel! We're in a clean room. We're this, we're that. Besides, I don't know any welders. We don't have any."

I said, "I know how. My dad was a welder. He showed me how to cut with acetylene, he showed me how to weld. Get me a helmet, get me some gloves and get me a torch, get enough acetylene and oxygen, and we'll make one cut here and one cut here. We don't have to make a very big cut. And if we can get the guys standing by, we can unbolt that thing, clear it up, have it hooked up, lift it, put it back, and then clean it up somehow and then be done before the first shift comes in."

He says, "You think we can do it?"

I said, "I'm willing to try it if you will. I mean, what can they do?"

He says, "Well, I know what they'll do to me. They'll fire me! I don't know what they'll do to you."

I said, "I'll probably have to live here forever to pay off my pension or whatever."

We went all over the Los Angeles international facility for North American Aviation, and we conned some technicians and they helped us. Here we are, scurrying with some acetylene tanks and some cutting torches, and they got some big old wrenches, and we took the bolts off. They broke one, but they took the other three off, and then they were standing by, ready. I mean, we must have had twenty guys, just beefy guys, ready to move and things like that.

So there's a guy up there, and he says, "You sure this is safe?"

I said, "It's safe. There's nothing explosive, nothing will burn. The only thing that'll burn is that paint. But if we can get somebody to go up—" Man, before we finished that sentence, a guy was there. He had a bucket of white, thick, goopy, latex paint and a brush, and he says, "You guys do it, I'll clean it up and I'll paint it for you."

So I got on the dang thing. It must have taken about fifteen minutes. I cut one side over here, and then I cut the other side, and then even as I'm taking the acetylene [hoses] and wrapping [them] up, the guys took it out of my hands, they wrapped it and they left the building, and then all of a sudden, you hear this creak as the guys are lifting and moving the structure. The other guys are hooked up and the liftmaster is there.

They lift the capsule. It must have cleared by that much on both sides. They lifted the capsule out, they went to the next work station, they went to mate it, and they continued on their normal process. Meanwhile, the crew we had back here, they pushed [the structure] back in place, they rebolted it, then the guys cleaned it all up, and they painted it white, and all you [could] see was half the thickness of this finger of the cut where the acetylene had gone. I mean, I cut it pretty straight, and I didn't make a big burn or melt or whatever. It was just a straight cut.

So it was painted and everything else [cleaned up]. And they went and painted the bottom over here, but they didn't paint the bottom of the other side. They forgot it, so it still had a little black "oops" on it. So we moved it and we said, "Okay, now everybody put everything back where it was, etc., etc."

He says, "Well, what are we going to do with this thing, Ernie? This is one of our facilities and everything else."

I said, "I didn't do anything to it. Did you do anything to it?"

He said, "No."

"Well, just leave it alone. Forget it. Let's continue with the processing on that airframe."

Oh my God, the next morning, one or two guys, then three or four, and pretty soon everybody comes and they look and they point and this and that and everything else. And we continue with our normal work in getting this capsule ready. The...[capsule] is on, it's on to the next stand, we're trying to finish the structure all around it, lay out the final wires, get the final ready for preparation.

The president of the company came down and two of his lieutenants and the resident office chief for Houston or for NASA came in there, and they looked and they called us back to the office. The chief project engineer for Rockwell, he looked at it and says, "You guys are a couple of "sneaky dog robbers." You went and you got some acetylene, God knows where, and you cut the thing in two, you moved it, and you pulled [the capsule] out, then you pulled it back, but you didn't paint the bottom. You left that thing burned over there, and you think you just come out here and cut a facility in two?" This and that. He said, "Well

done—Goddamn, you saved our ass. Well done, guys. Keep it up." That's the only thing [that senior management ever said].

Of course, everybody else knew about it, and they said, "Hey, how you doing, Ernie? Got your welding cert?"

I said, "I don't have to weld. I was just cutting."

He says, "Next time, paint it all, man. You left a spot open."

I went and looked. I said, "Oh, they forgot to paint that part of it."

Everybody in that plant was on pins and needles. Everybody was happy. There was no reprimand for Jack Nolan, there was no reprimand for me. The Rockwell guy gave us a "well done," and some of the NASAs, it got all the way back over here [to Florida], that "You sent a guy over there and he cut that stand in two. But they saved the day. They pulled that capsule out."

One of those things that nobody hears about, nobody knows about, but had we not done that—first shift talked about things a lot. They talked a lot. Second shift did the work, third shift cleaned it up and hid it. That's the same anywhere, okay? But here it is, and they say, "Well, what did you do in the war, Dad?"

I said, "I cut a stand in two." And it's just one of those trivial things.

Jack never got it, he went to work for TRW, eventually, out here at the Cape as a spacecraft manager, and once in a while he'd invite me to lunch and we'd chat a little bit, and he says, "Ernie, you need anything cut around here?" [Laughter]

I said, "I hope not. I don't ever want to get into that box, Jack." We weren't dumb, we weren't stupid, we took a real chance, but it was needed to be done. That's the kind of people that we had every stretch of the way.

[On] the same capsule, we got to the point that we had to put the heat shield with all the parachutes in [and we couldn't make the forward heat shield fit!] We couldn't make the bolts fit into the little holes. It just—no way to reach them. So we're standing there and we've been doing that. Then I studied it and I studied it, then I went to one of the techs and I said, "Could you get me some long rods?"

He says, "Oh, man. We've got requisitions, and we've got to do this, and we've got to do this."

I said, "Okay. I'll tell you what. Can you get me some cutters?"

He said, "What are you going to do?"

I said, "I'm going to go where you hang all the white...[room clothes]. I want to cut some coat hangers, and then you're going to do me a favor."

"What's that?"

"You're going to drill those bolts. Get the GFE [Government Furnished Equipment] ones, though, not the flight ones, and just drill a hole all the way through the bolt."

It was a circular bolt that had a hexhead drive, and then this was threaded here, and at the very end was a tapered...[rod], and that...[rod] was about this long [about 8 inches]. So he drilled a hole through the top, all the way through the bottom. We got a coat hanger, we bent one end and then it was a straight shot. So then what we did is we put the cone on top, and at one of these four places where it went against the structure, the coat hanger, we could reach and put it into the [capsule] hole, such that the bolt just found its own way, then you could start turning it. Then you pull the wire hangers off and you tighten it all the way through, and it sat down [tight].

So in the afternoon, the project engineer comes out and we'd been working at it three, four days, and he says, "What did you do? God, it's all sealed. What's the clearances?" And he starts measuring, we measure all the clearances and everything. "That is tremendous. How did we do it?"

I said, "Well, this is what we had to do."

He says, "Oh, my God. Did you drill the flight holes through those flight hardware? You know, those are a long lead item, this and that."

I said, "Wait a minute. We used some GSE ones, but we drilled a hole, then we put a coat hanger."

He says, "Jesus Christ, Ernie. Whose idea was it?" The NASA guy you couldn't hurt.

See, the company—I said, "He was."

He said, "Ernie, goddamn, you did it again. That's a great fix. Let's try it again." So we unbolted them, and we took the thing off, then we put the coat hangers through, then we showed him how it was to work. He said, "Goddamn, that's terrific. Why don't we think of these common-sensical ideas?"

I said, "You guys are too close to it. It takes an outsider that hasn't seen it that long to just suggest."

They put flight hardware in all the Apollo capsules were then fitted with bolts with holes through them, and we didn't use coat hangers. We used a little bit more exotic piece of welding rod or something straight. But that was the Reyes fix, and as a result of that, the NASA wrote me a letter and my boss called me from here [Florida] and thanked me, and they gave me, what do you call it? An on-the-spot award, or a quality step increase or something...And there were many of these kind of little details to work through, but it was

the first capsule that we brought through and we went there for two weeks and spent four months.

We went through the Watts riots with my family. I couldn't find a place with my family. They would rent [to people] with dogs and everything else, but they didn't want [to rent to couple with] children. And finally, I was a block away from the Watts area when it started, so I had to move my family all the way to Burbank, and then I commuted. It was...[a real] effort [to commute to work everyday].

We finished, and finally we got ready to roll out and one of the managers in charge says, "Ernie, we've got too much paper, too many things. How about you guys check with your flight crew members, check with whoever you have to, and then get in the capsule and whatever you think is good, you accept. Whatever you think is bad, we'll red-tag and we'll clean it up."

I walked into that capsule, and my God, I thought I was in a spaghetti paper factory. There were just so many little things that needed done, and some were garbage. The guys, they read the numbers upside down, they said they were wrong, but if you looked right side up, they were right. So we took a lot of...[items] and as a result of that...[review], the...[capsule] was ready, and we shipped it out.

We came to Florida, I arrived in Florida, and I said, "Okay, this is airframe nine, we are ready to go."

And then my boss says, "Okay, Ernie, you're working second shift."

I said, "Second shift? Jesus, I just finished four months on that and we're going to process this capsule?"

So that went for about four days. While I was gone, some of the political shenanigans, somebody else decided, "Well, I want to be first shift, and let Ernie be second. You know, he's been away anyway, he doesn't know anything."

So I showed up, and guess what? They [didn't] know how to put on the forward heat shield, because they didn't know the trick with the coat hangers, because they hadn't been caught up on all the procedures. So I went and showed them, and the guy that was in charge down here was a guy named Hank Kuznicki. I had gone to college with him, and Hank Kuznicki says, "Well, how come Ernie's on second, since the work, most of it, was going to be done on first, and I just got off the phone with the guys who said he was the man of the hour? So something's wrong there."

Man, within half an hour, I was back as the lead on that airframe, because I was the lead, that's why I went to California, but then when I came over here, I lost the lead due to some politics... So I showed them how to do [the trick] with the coat hangers and I showed them how to do another one on the aft and this and that, certain things that we had learned on that particular capsule.

So as you do a few things like that, your name starts percolating. "Well, we've got a problem here. Why don't we send Ernie? Why don't we do this and why don't we do that?"

I was an ops engineer, but after a while, my boss, George Page, became a bigger boss, and he said, "Ernie, we need your help, not only on the command module, but also on the lunar...[lander] ones and I need more help than I've got, and we're not going to hire a whole bunch of people, so I'm going to make you the chief of the branch, and you get to assign the operations guys and you get to assign the spacecraft manager, but you're responsible for it all. But you got too much on the stick and you just communicate, run, tag the bases, you got the

phone book, you got all the contacts and make it work." That was his direction to me: "Make it work."

So I spent the Apollo years trying to make it work, making the command modules, service modules work, working with the guys from Bethpage and New York [on the lunar landers] and here, obviously, to make them work out the intricacies of the problem. Our job was to get the capsules ready, then we turned it over to the testers, they tested it, and then we turned it back to the working level men and women, and then we'd disassemble it and put it together and ship it out to the pad—34, 37, or 39.

So it was the beginning of the Apollo years. The airframe was the biggest one to go in to do four months, and then stay there for a long time. We did the Apollo 1, we did the Apollo 4, was after the fire. But before the fire, we had airframe numbers, and when Apollo airframe 12 came, that was the Apollo...[one] capsule. And you had Gus and you had Ed [Edward H.] White [II], and you had Roger [B.] Chaffee. Chaffee was a rookie. Ed White was a West Pointer. He had flown on Gemini and we had had dealings with him on Gemini.

On Gemini, they decided that we were going to go EVA. The Russians had gone EVA and we wanted to do more than just this, so they devised that little gas cartridge gun and we went out there and we measured on the side of the O&C building [for EVA support cables]. It was called the Manned Spacecraft Operations and Checkout Building, but those of us shortened it to the O&C, Operations and Checkout Building, and we marked [the EVA support cables and hoses] from the door out to the parking lot, and we marked thirty-some feet, because we only were allowed so much storage and the cable recoiled, and we thought he was going to have a problem there and he did. They picked too thick a cable.

But we measured it, we swedged it, we made the com cables and we hooked it up, and the rest is history, when Ed went out there and had a good time. He was a West Pointer in every strict sense of the word, and he was assigned to Apollo 1, or spacecraft 12, as we called it. The other guy was Gus, and Gus was going to be the commander, and then obviously the rookie was Chaffee. Chaffee was a nice guy. More on Chaffee later. That was the prime crew.

The backup crew was Walter [M.] Schirra [Jr.], and [Donn F.] Eisele and [R. Walter] Cunningham, I think, I believe. That was eventually the Apollo 7. I don't recall exactly what was the backup, but I do remember Wally. Wally was not very cooperative. Gus wanted some things and then Schirra wanted something else. The way it was, here's three crew members. They live in the quarters and if they want something, they go to the test conductor or they go to George Page, who was the chief, or they go to me to say, "Build it this way."

For the Gemini capsule, some of the guys, like [James A.] McDivitt, got to see the Pope and he gave him a medal, so on his ship we had to screw the little medal on it. On one of the Apollo flights, [David R.] Scott wanted a shamrock control knob anodized green for his center couch, so you build them specially for the crews, okay. They were nice guys, and they were putting [it] on the line, [so you did what you could for the guys].

Apollo 1, we had a problem. Gus wanted certain things for his crew, and when he got out and the backup crew got in, then Walter Schirra wanted something different, and you got the same thing. Okay, you have a car. You have white Velcro netting with little straps is what we had for the capsule for Gus. Well, Walter Schirra wanted baby blue, so we had to rip up all the white and put in all the blue every time we switched crews, you know.

A lot of people don't know that. A lot of people say, "Hey, here's the crew members and here's the crew members." Hey, I'm the keeper of the car, the shop, okay. I'm the keeper of a capsule. I'm the keeper of the NASA guys that work on it. There are three guys that work for me on this ship, first, second and third shift. We work seven days a week, three days—every day, including Christmas and New Year's.

Then we had the members of the checkout team, which was the technicians. Oh, my God, we finished it. Okay, well, let's disembowel it and put it in for the backup crew. And we didn't have a go-between. Like Gus says, "Well, Ernie, I want this and don't change it."

I said, "Yes, sir, you got it, Gus. See ya." Leave his quarters, go away.

Then Schirra would say, "Ernie, I want this changed."

"Well, Gus wants it this way. He doesn't want it changed."

"Well, I don't care what he wants, you change it."

I said, "Hey, guys, I'm not a GS-99 yet, you know. I'm just a grunt here. I'm just a contractor. And I can't do the total change-outs."

So he says, "Well, I want this and I want that, and I want this and I want that."

So I was caught in the middle between the two crew members, and Skip was caught in the middle a little bit, but it was, okay, I'm going to assemble it. What do we do? So here's the capsule, it's undergoing testing, it's undergoing modifications. We go into chamber testing and we do the work, then we get into testing for the chamber, run over the Christmas holidays, and Schirra was not happy, because he was invited by the Kennedys to go to somewhere or other, and there he was, working in the capsule and then we were. And there were some words said by some people on that, so Wally was not well loved and the "Earth to

the Moon" says it. You don't have to take my word for it. I just won't comment. I'll just tell you that there was a problem between the two.

We got to the pad, we had a lot of things required to be done, and then the netting needed changing. Then White called and he said, "Ernie."

I said, "Yo."

He says, "I want all these switchguards painted yellow and black."

I said, "Like on your jet aircraft?"

He says, "It's just like on my jet aircraft. I want all these switchguards here."

I said, "Well, I tell you what, Ed. I can't."

He says, "Why can't you?"

I said, "It's just a lot of work to be done in the next couple of days. We've got to do this, plugs out, plugs in. You guys are going to be sitting in there, and if we remove that switch or those switches, you'd invalidate the electrical parts, and I don't think we want to do that."

He says, "Well, I want them changed."

I said, "Well, I'm sorry, I can't honor your request."

He says, "Well, I'll just go—"

I said, "You don't have to go any further. I'll go for you."

So I went and talked to the chief of the resident office, and at that time, the chief was a guy named Archie Moorse, and the lieutenant, or the main guy, was a guy named Walt [Walter J.] Kapryan, who later became launch director.

This is what the inside of the capsule looks like, and inside that capsule you have the various panels, and each one of these panels, where it calls it, has little switchguards so that

you don't bump it inadvertently. You've got to hit it up and down. So on all of these switches, that are like this and like this, and like this, and like this, and like that, he wanted them all removed and painted yellow and black. That means you've got to drop the panel off the ship to do that.

I said, "It's not possible." This [referring to a diagram of the switches in the Apollo cockpit] is from *From the Earth to the Moon*. This is part of what I was having to prime free-throw switches for them. So I said, "It's not possible." So we discussed that. That was two days before the fire.

The morning of the fire, Skip Chauvin and I sat and went over the constraints list with the leadership of the contractor...Chuck Hannon, the chief test guy Bruce Haight, the chief engineer. And we went through all the paper.

A lot had been said. The movie, *From the Earth to the Moon* showed it very graphically. But we had a fire, we had an aircraft fire inside an oxygen-enriched capsule, and the guys died within eleven seconds. They died because they breathed fire, and they died because they were up and around and not in their seats. They were having communications problems and they did a lot of things that shouldn't have been done.

I have my own idea as to—I know exactly what happened, and I'm going to write it when I write my book. The NASA was a—it's not a whitewash, but the NASA was, "We're not going to say that it was the crew's fault," by definition. The day that the report was released from the NASA was the day that the suits and helmets and everything were released to us, the investigative team, so we didn't even have a chance to investigate that part of it. They brought in people from the fire service and everything else, but how do you go in a fireplace and determine what the situation is? You can't.

The fire happened, and it happened in the afternoon. I came home. It had been a bad day from early in the morning. The guys got in, they didn't like it, it didn't smell right, and...we took several sample bottles. There is a story written by Father Faraday, who was hired to write, and he wrote, the history of the fire, in detail. They printed it, and he goes into it. Anybody that's going to do a history of the program needs to remember that that is a truthful event. He wanted to write a story about how St. Teresa's parish sent men to the moon, because every day he would meet some of us that went to church out there at work, and he said, "Well, this is how St. Teresa's sent men to the moon, St. Teresa's parish." But it talked about the ins and outs of what happened, at what time and everything else like that.

BUTLER: What's the title of that book?

REYES: The title of his book is—it's about the moonport, history of the moonport.

BUTLER: Okay, great. I'll have to look for that.

REYES: You need to read it and understand part of it, and understand that the whole story is not there. I will write the true story for my children...It was a hot [oxygen fed] fire. They died because they breathed fire, and the quartz glass that was supposed to melt at several thousand degrees on the oiler struts inside the capsule, because of the windstorm, they moved.

The fire started by the ECS [Environmental Control System] unit, the fire grew in intensity, the pressure on the vehicle built such—it was a composite, truncated capsule. I've

got pictures to show you of the capsule when it was built. As the pressure went up, it ripped. It ripped around the bottom of the base part, so now you had oxygen feeding fire and fire flowing across the cabin and fire escaping out of the surrounding crack around the seal on the capsule.

Here's the glowing gumdrop and here's the fire coming up the sides of the ship, tickling the launch escape rocket motor at the very top. So the technicians, once they knew they could not put the fire out on the capsule and open the door, because it was sealed from the inside, concentrated on getting firebottles and spraying the coolant, not at the fire, but at the nozzles under the rocket engines to keep it from igniting.

Had it ignited, it would have gone up, it would have hit the structure, but it would not have escaped and it would have settled down, and it had enough strength that it would have broken the capsule away from the service module. Then on impact, it would have collapsed the service module onto the SLA [Spacecraft LM] adapter. We didn't have a LM [Lunar Module] inside; it was empty. Then it would have hit the S-IVB. That would have gone high order, it would have hit the first stage of the S-IC. That would have gone high order and we'd have killed everybody at the pad. We would have had a really, really bad thing.

So these guys [technicians fighting the fire] went out, and the stupid pad was designed such that the doors would open up and close and they couldn't come back in the same door, so they had to scurry around and dump the bottles. My desk was right outside the opening of one of the [CM (Command Module)] ports. We had a little work table, and I left an area that was clean and immaculate. I came back, and there were fire bottles, lunch pails, clothing, smoke, melted plastic. Ah! Terrible.

I came home because I had a boat that was delivered, and at 5:30 I said, "They just had a problem up there. That's it. I've got two [of my] guys waiting here, they can take over, I'm going home. Call me when it's over."

[When] I...[arrived] home, my wife's parents...[were on the telephone wanting to and] making funeral arrangements for me in El Paso, getting ready to ship my body from here to El Paso for burial, because [they had heard that] there had been [an accident with] fatality at the pad, and they knew that I lived at the pad, worked at the pad. Then I turned the TV, radio, whatever it was at the time, and they said there had been an accident with fatalities involved. I said, "Oh, my God."

Then I got a call from my boss, not George Page, but his deputy, Chuck Gay, and he says, "Ernie, we've had a real bad fire and the crew is dead. So we're going to need you later tonight, so just stand by."

I said, "Oh, God. Okay." So I came home, I was home. I had supper, and I'm saying, "Oh, my God. God, what could it be? I wonder who got killed." Well, the crew got killed. The crew was dead. They had to advise the administrator and all the parties to be and they shipped...[astronauts] from Washington to Houston, from Houston, they went to tell the wives and everything else. And in the meantime, the bodies stayed in the capsule.

So about 11:30, Chuck called me and said, "Ernie."

I said, "Yes, sir."

He said, "I need you to come...[in] and take over. The guy, John Murphy, he's the pad leader, he's been sitting up there and he's been doing this and that, but we want you to come up here. We've got the mission investigative team formed and they're over here. They're meeting at the O&C and they will ask to see various things, so we want you to be at

the pad. Frank Borman is going to fly in from Washington and we're going to talk about what we want you guys to do and everything. So why don't you just plan on coming and staying a while."

I said, "Okay."

Took my car, drove up to the pad. The pad was closed out. I mean, you couldn't get to the gate. I got there in my little Volkswagen, showed them who I was and they looked at their list. Yep, there's this long...[sheet of paper] with two names on it. [Laughter] The guy that was there and mine. So I said, "I'm this guy." He says, "Yes, you are." I drove up to the pad. I said, "Can I drive, or do you want me to walk?" He said, "No, you better drive."

So I drove up my car, then they questioned me at the pad. "Yep, that's me, second guy on page thirty-two, okay."

Then I walked into the elevator and there was a guy there and said, "Are you—?"

"Yep, that's me, right there, okay."

So I went up there and I got off the elevator and I looked inside the entrance to the white room, and there were some guys working, and the firemen. The fire crew was there. They had just gotten there. And I looked and I said, "Oh, my God. Jesus."

...Once we got them out, they put the body bags in the white room. We zipped them into body bags and they took them away in body bags, GI issue, white, zippered body bags, and they took them out. And that was it. Nobody else was there. It was just lonesome Joe and myself, that is, and I'm looking, and I'm looking at all these fire bottles. I'm looking at procedures, I'm looking at hardware, tools, lunch boxes. Everything is just completely scattered everywhere.

So I start saying, "Jesus Christ Almighty. What the hell happened here?" And I started thinking, and I'm looking at the cabin and I'm looking at the cabin. I must have spent an hour or so, and I had communications where they would call me and say, "Are you there?" "Yeah, I'm here. Here I am. No, I'm not touching anything. No, I'm not disturbing anything. I'm just looking for a place to sit or lay or do something."

And then after a while, here comes Borman, Frank Borman. Frank says, "Ernie, how are you doing?"

I said, "Just fine, Frank."

Frank had flown on the Gemini, so I had known him casually, but he says, "Well, Ernie, we were at this place and we were informed, so I just changed my stuff and put on my jumpsuit and flew down here." I don't know if he'd been to Houston or what. In that time frame, he had time, that's for sure. But he was there and he had been talking to the investigative board that was meeting in the O&C, and they wanted to run a switch list.

I said, "You want to what?"

He says, "Yeah, we want to run a switch list."

I said, "Okay."

He says, "Ernie, off the record, we knew that eventually there was going to be death involved. We talked about going to the moon, and we knew that there would be fatalities involved. Of course, we always thought it would be in orbit or on going or coming, but how did they look? How did they look?"

I said, "Well, Frank, they looked like they were in an aircraft fire," and I described everything in detail, as much as he wanted to.

He says, "Well, I needed to know. I wanted you to tell me." He said, "Were you there?"

I said, "Yeah, I helped here, and this and that."

He said, "Okay. Well, Ernie, we want to run a switch list. What do you think?"

I said, "Well, before we disturb something, we ought to take pictures so that people know what is what. I can tell you one thing, White was on his couch, that's why you don't see the burn on the buckles, but the fire was going on and the buckles burnt, so when he broke through the buckles and turned himself around, so that those buckles were seared. Chaffee's leg pans [(a part on his crew seat)] were down and he was laying on half of his back, and he was laying on his, because there's no damage to any of the harnesses, his procedure or nothing. And Gus, he's been crawling all over his place, so you can tell where he's crawled over it and this and that."

He said, "Very astute."

I said, "But isn't somebody going to take pictures?"

He says, "Let me call."

So he called, and a guy named Taub, T-A-U-B, Bill Taub, I think his name his, from NASA headquarters, he's the photographer, he shows up and he starts taking pictures. So he took pictures and he took pictures and he took pictures, and every time we went in there, to climb, to do something, he would remove things, and they would take pictures before and after. And what we agreed to do was, he said, "You know the configuration?"

I said, "Frank, I've been living with this airplane now almost a year. I know it." For example, the panels are panels one, two, three, and they're like this. This is a caution and warning up here, then this is panel one, this is panel two, this is panel three, this is panel

seven, this is panel four, this is panel five, three, two, one, nine, and six. If you look at the capsule, that's how they're at.

I said, "Okay, Brother Frank, let me suggest, and you decide."

"We don't know. It's all burnt. You can't tell very much, but if we go to push something and we can't push it in, but we can pull it out, we know that it was in."

He says, "That's right."

"And as far as the rotors, we can tell if it won't click over, that means that it was already at that position."

So for the next three, four hours, we did this to the [capsule interior] panel[s]. In other words, what was the configuration of the capsule when the fire happened? In other words, where were the switches? And it's just not five or six switches. I mean, it is—you see them [referring to a blueprint of the switches – there are probably about 150 to 175 switches].

We finished that. He went off. They did their report to the investigative panel. I thanked him, he thanked me, we thanked each other, and we went on our way.

We assembled all the bits and pieces in what we call now the vertical processing facility. We put plywood tables and we put all the components there, and then we got airframe number 17, and we put it in the identical configuration to help them. But there were all kinds of inquisitive folks doing all kinds of inquisitive things. And the power plays came to be. The astronauts insisted that they were going to be in charge of the capsule, so...[an astronaut] named [Edward G.] Givens [Jr.] showed up one day, and he says, "Ernie, I'm going to be in charge."

I said, "You got it. What are you going to be in charge of?"

He says, "Well, I'm supposed to..."

I said, "Well, let me tell you this. This is what we're doing. If you want to be a key to all this good thing, by all means. We're here to work together."

He says, "Well, that's refreshing. I thought they said—you know, whatever you guys want to do, I'm just letting you know this is what's done and this is what the plot has been, and this is how we get our communiqués from the investigating area of people down there, the investigative board." So he let his guard down and I let my guard down, and we worked okay. Unfortunately, before the thing was over, he had a tragic accident in Houston, driving his little sports car, and he was killed in Houston.

They didn't send any further astronauts to take care of working with what we were doing, and basically, I was the NASA guy in charge of disassembling. They want this assembled, well, let's do this, and let's remove this and let's take that. And it worked on.

In the meantime, the Block II vehicle was being built, by North American Aviation, based on what had happened on Block I. So some of us got involved in some of that and some of us did not.

The next launch was not Apollo 7, but rather was Apollo 4, which was a [Saturn V] flight. The numbers were a little messed up, but Apollo 4 was a can man inside a Saturn V, and a Saturn V was a tremendous thing. We were doing the investigation, we kept doing this and then...they launched that Saturn [V, Apollo] 4. My God, it brought tears to our eyes to see such a huge, huge rocket taking off and flying and going right above us.

I saw the history on TV the other night of the Arlington National Cemetery on the History Channel. Invariably, people do things wrong, but nobody says anything about them. It showed the pictures of all our astronauts that are buried there. For the mission, I don't

know who it was, but they used their heads on the Apollo fire, we had the three gentlemen that were burned. White was buried at West Point. Grissom and Chaffee were buried at Arlington [National Cemetery].

What they did is they brought an airplane down and they invited some of us—the pad leader, the test conductor, myself, you know, a few technicians that were involved—and they invited us to go up there, and Rocco [A.] Petrone, who was our launch director at the time, he took the group, and we flew and landed at Washington and we dropped part of the team there and then the rest of us went on to West Point. He toured us around West Point, told us this, that and everything else.

We went in a chapel there, and we're sitting there. You're sitting in a chapel and you're waiting. There's a casket and whatever. I looked back there and oh, I thought I was going to have a heart attack. There's Ed White walking down the aisle. I didn't know he had a twin brother. It was his twin brother. But I'm telling you, God Almighty, I saw him and I thought he was coming after his yellow and black switchguards for me. [Laughter] Ed White was a little arrogant. He wanted his stand, by God, he was going to have it. Okay. But there he was. It was his twin brother. I never knew he had a twin brother. Talk about getting shook up.

Anyway, the boys—whoever it was, arranged for us to go on an airplane, propeller-driven, and they took us to West Point and the other folks went to the services at Arlington, and there was Gus and Chaffee. But in the TV show, they said they were doing their dress rehearsal, because the following day, they were going to go in and they were going to do a plugs test on the Saturn V rocket, which was this, that and everything else, and they

described a Saturn V. They were on a Saturn 1-B, which is a vast difference from a Saturn V.

So you say to me, "Well, Ernie, I don't know the difference." Yeah, you do. If I show you, you will. [Referring to models] This is a Saturn I-B. This is a Saturn V. This gets to about this. Don't tell me that the Apollo 1 crew that burned was going to go into a Saturn V, when they were flying off a I-B. It's not a big thing. I doubt that anybody catches it, but, my God, if you're telling a history to the nation, you ought to be accurate. That's wrong. It was a I-B, it was not a Saturn V.

But anyway, they did well, because they invited us and they took us, and I thought that was really wonderful. They did the same thing with the *Challenger* crew. Some of us were flown to Houston for the services there and everything else, so that was very, I thought, very wonderful, of the people to do that.

The Apollos went on and on, and it was helter-skelter. There was always three in flow. We were working around the clock. There's many, many, many funny stories to do with the people, to do with the situations, and there's also discussions and things. I called my sister-in-law in El Paso because in my chapters I want to write about what happened after the war at night in El Paso.

We were discussing a problem on a Sunday out there at Complex 39, and the launch vehicle people are talking and yelling and screaming and going on and on and on, and there's Dr. von Braun and there's Dr. [Hans] Gruene, and they get real hot and they start going in German, and then Rocco Petrone says, "Speak English! Speak English!" He didn't understand German.

And I thought, "That's amusing. Here we are, spacecraft's on top, we're percolating, we're ready to go, we've been checking out, and these launch vehicle guys, all you got to do is run for fifteen, twenty, thirty minutes, and they're done, and we've got to have our machines work and percolate for two weeks. Come to the moon, pick up the rocks, come on back, man the rotor, do all the good things, recover. And these guys, all they've got to do is run for fifteen minutes. Now, what can be so difficult about that?" Well, it's a tremendous rocket ship and everything else. And here is our position in the stands.

By the way, I have pictures of all these things I'm telling you. Here's our position in the racks, and behind us was the public affairs. Jack [John W.] King was here, and all the launch directors and all the high muckety-mucks. And on this squirrel cage—I call them "squirrel cages," it was a glass room. In a corner sat von Braun and all the other guys. Von Braun's coming back and he's got his German newspaper. He always had his German newspaper with him. I said, "I don't want to hear it from you, not today."

He says, "What are you talking about?"

I said, "Well, you're the guys that started all this mess. Now, let's be cool about it. Let's not have such a disturbance over here. It's Sunday. You should be more subdued, this and that, this, this. Besides that, it wasn't always fun and like this. I remember about that rocket you guys launched into my neighborhood."

He said, "What?"

"You know, the old V-2 rocket in Juarez, Mexico."

Man, he turned white, he turned white. Then he walked behind me and sat down and says, "How do you know about that?"

I said, "I know a lot. I was there."

He says, "You were there?"

I said, "I was a young boy, but I was there."

He says, "Well, tell me. What happened?"

I said, "Well, you guys launched a V-2 rocket that night, and instead of going down toward the range, you didn't have a radar station, you didn't have a destruct system, and the V-2 rockets that are going that way went this way, caught the tradewinds and weathervaned. It went south, southwest. It went toward El Paso, and it flew, and because you guys weren't using inert warheads, you were using warheads, 2,000 pounds of TNT, it went in and it hit about a block and a half from downtown Juarez, Mexico, across the river from El Paso. It hit a cemetery."

I was inside a Greyhound bus. My dad was working on a transmission or something, in front of our house. We lived on Leon Street. There's a dirt road out by Pizano Drive now and then there's Santa Fe Street and you go down past the powerplant and there's the International Bridge and there's Mexico. The river turns around there. We lived by the railyards in the south part of town, in that town. That was our home ever since the beginning of World War II.

I said, "I was sitting in a Greyhound bus, my dad was working on it. All of a sudden, woomph! And the bus jumped up and then my dad came running and said, 'What did you do?'"

I said, "I didn't do anything, Dad, but something went boom from over there. It came from over there."

"Why?"

"I saw the light. There was a big boom over there." Sirens, police cars, the air-raid things, people are looking. They thought it had been the natural gas reservoir, they thought it had been a munitions train, they thought it had been something. There were fire trucks, police cars, everybody's all over the place.

The next morning [30 May 1947], here comes a picture. "V-2 rocket lands in Juarez cemetery." ...And here it was, a thirty-foot crater, with bones and caskets and stuff all over. I said, "And that's you guys—"

He says, "Yes, it was a bad thing. It was a bad experience."

I said, "I bet it was." But it didn't cause an international incident because of the good relationship between the United States and Mexico, and the very close community of El Paso and Juarez and everything.

But after that, I'm sure, yeah, after that, we had to have a destruct system, and after that they put up the SPS-18 radar unit for us, and they tracked our flights and everything else. But, oh, my goodness. "You knew about that?"

I said, "Yes, I know about that."

"Well, when did you first—?"

I said, "Well, first of all, I would go to the movies and I would see the V-2 rockets on the movies, and they had the painted checkerboards on the fins for roll maneuvering, and you put a certain paint pattern. I know that, too, because I worked with the German so and so at White Sands, and we had a paint pattern for the Apollo capsules and all this good stuff."

He said, "Yeah, that's right. So-and-so did that for us," and this and that.

I said, "And the other thing is, because you folks wanted to be very inconspicuous here, you took the dirt road on the way around my house by the railroad tracks, by the depot

and all the way to Las Cruces, and then from there over the mountains, where you launched out of White Sands. And at first you had canvas over the V-2 rockets, but you could tell what it was. I could tell it's a rocket. I was not a full-fledged rocket scientist yet. I was just a little kid. But I saw that, and I would go out there in the morning and see the GI trucks in front and behind, not too many. Then after a while, you didn't even put canvas on your rockets. They were just V-2 rockets, all white, with black paint patterns on them."

He says, "Yeah, the tarp kept rolling off and falling off and we didn't..."

I said, "It's your rocket ship. You can do whatever."

He says, "That's fantastic. Tell me more. I want to know, how did it feel? How many meters were you away?"

I said, "Meters? Well, let me see, one centimeter equals 2.5, six centimeters equal one inch." I said, "Well, I don't know, I was maybe a mile away, a mile and a half from the point of impact."

He says, "How did it feel? What did it feel like?" He was interested in how this child felt at the receiving end.

I said, "Well, I was in a bus, but the windows were open and everything else. I felt an overpressure, obviously, the overpressure a mile away. But I did see the burst, once it burst, because there were no tall buildings. And I'm looking straight down at the road and there's railyards and there were no trains there so you could see the sky lit up a little bit."

But he always wanted to know, how did you feel, what was your reaction, how did you physically feel, and did the earth rumble from that impact of that V-2 rocket? He was interested because he had fired one in peacetime and it had landed there, but he didn't know of anybody that had ever told him. So, first of all, he was astonished that I knew anything

about it, and once we talked a little bit, he would come in on Sundays or weekdays, or whatever, with a newspaper, and if I was on station, he'd say, "Ernie! How's my good friend, Ernst?" He called me Ernst, because I was Ernest. And says, "How's my good friend, Ernst? How's my V-2 friend, Ernst?"

So we talked about his friends at White Sands and how they had built White Sands and the [unclear] test stands, and I had questions, too, about, "How did you build this, and how did you build that?" And then I told him, "By the way, in your next lifetime, when you design a blockhouse, for God's sake, make it big enough. Your blockhouse at ALA-3..."

He says, "You've been in that blockhouse?"

I said, "We launched Little Joe II for the Apollo Program."

He says, "You used my blockhouse?"

I said, "It's your blockhouse. Half of it was for this and the other half—"

"Oh, my God, you had it in two?"

I said, "We only ha[d] half of it. The Army had the other half."

The blockhouse is a German blockhouse, built to the metric system, built with his prints from Germany, and it was the first and only blockhouse built, the first one there at White Sands. As you go down the thirteen miles, it was the first major launch complex, ALA-3, Army Launch Area 3. So we developed a little bit of rapport there, in and around his V-2 adventures and my questions about his blockhouse, his pad, his processing of, "How did you process the thing horizontally, and how did you get the alignment?" I'd had various questions. I had studied his V-2s at New Mexico State University, because we had a V-2 rocket engine and we checked all the flows and everything else, but here you're talking to the father of the V-2 rocket. I called him one of the biggies in the rocket business. And how

many other people do you know that could sit down and reminisce about the old days with the guy?

So you got to know a lot of people in the business that I was at, sitting up there. We followed the Apollo Program. The Apollo Program was extremely exciting. Every mission was new. We had all new astronauts and we had all kinds of funnies. I showed you the picture back there with the raccoon tail, and that is Apollo 15. That is the first lunar rover. The first lunar rover was built—well, the rover program—was built at Kent, Washington. It was a big secret where they were built. They were built in Kent, Washington, by the Boeing Company, and I guess it's because Marshall had money and they chose to develop that way. They were developed under Marshall's guidance, but Marshall was rocket and structure guys for manned vehicles and manned interface. They relied on Houston, and then for integration they relied on Kennedy.

So we sent a couple guys up to Kent, Washington, and we sent them to Marshall. They had to stop at Marshall, politically, to take pictures of it. Then they brought it to Kennedy and we folded it and we moved it into the [processing] stand, around the training building, and we put funny tires on it and made simulators of them. But we kept the real ones in the white room. We folded the tires. Everybody worried about the wire mesh [wheels] ...At the O&C, one...[end of the high bay] was [for] command service modules, the other...[end of the building] was lunar modules, ascent, descent. After they were all checked out, we made it and put them together, put them on a stand, put the legs, folded them, extended them and then we put the MESA pallet, the Modulized Equipment Stowage Area. When you see Neil [A.] Armstrong come down, landing on the moon, he pulled a D-

ring and the thing fell over, a pallet on cables and it had a TV camera, that's how he got his pictures of him climbing down on the lunar surface.

On the other side was the RTG, Radioactive Thermal Generators, which were small...[radioactive devices] to power all the experiments on the moon, and then on the other side you had the lunar rover—LRV, Lunar Rover Vehicle. And we had a lot of fun with that. Dave Scott was the first...[astronaut] that went and checked that out in Washington State, and it was like lawn chairs [on a go cart]. He put it on [the safety straps] and one strap was too long. He put it on in Houston and it was too long. When he got to Florida, he said, "Ernie, it's still too long. It's going to be in the way and it's this and that. When are we going to ever fix it?"

I said, "You want my idea?"

He says, "Yeah."

"You got scissors in your pouch?"

"Yeah."

"Cut it."

"What?"

"Don't have to fix it."

So he got his scissors out and he went [makes cutting noise]. It's just a strap, nylon strap. He says, "There it is, guys. It was too long in Washington, too long in Huntsville, and it's not very long now." Oh, my God, so they picked up the appropriate paper and he said, "What do you want to do, Ernie?"

I said, "Well, you can sew it over, but that takes more weight and thread and everything else, or we can just put a hot plate on it and sear it, nylon, and it won't unravel

anymore." That's cheaper, we were looking for weight loss, so that's what we eventually did to it, and Scott was very happy.

So the day comes, we've got a command service module over here, being checked out and getting ready to fly. Here is a lunar module, and here we've got a cast of thousands. You've got the Grumman Engineering Corporation, and then you've got all the guys that have been working with them, you got the crew people, you've got the suit people from the International Latex [Corporation (ILC)], the brassiere company that makes spacesuits for NASA, and we got them walking around in a Block I lunar suit, with the suit, the gloves, the feet and everything else. Shhhhhh. Trying to get into the rover and put on the batteries and make sure that it steers properly, no wheels turning and everything else. And everybody was super uptight. I said, "Oh, my God." So I went and I talked to Dave.

By the way, after the Apollo fire, they formed a new person on the team, FCDR, Flight Crew Directorate Representative, somebody that could break the ties between the prime crew and the backup crew and decide all these little goodies. And to this day they still have them, FCDRs, and they are the spokesmen between the various crews and every[body] else.

So I went to Jim Smotherman. He was the man doing that job. And I said, "Jim, got a small problem."

He says, "What's that?"

"All the guys, all the Grummies are uptight, man. All the guys from Long Island are upset, they're all uptight. All you've got to do is say one big boo, and they're all going to fall apart and turn to dust."

So a friend of mine by the name of Carol O'Toole, secretary to the resident office, Mr. Archie Moore, the Houston resident office, I said, "Where's Carol? I was talking to her the other day and she just came from Cherokee, North Carolina, and she bought an Indian headdress for her son. I need to talk to her real bad."

So I said, "Carol, I need to borrow your headdress."

"The whole thing?"

"No, no, no, no. I just need to borrow the raccoon tail."

She says, "You're kidding."

I said, "No, I need a raccoon tail. I really got to have it today." So I got the raccoon tail from her. She lived on Merritt Island.

I went up to the crew quarters and I said, "Dave, we've got a basic problem that you can solve."

Jim happened to be there, so Jim says, "What's up, Ernie? How can we help?"

I said, "Well, here's the situation. And this is what I want you to do, and if you could do this."

"Hey, I think that's a great idea. Yeah, let's do it. Okay, you double-bag it, and we'll do it."

I said, "Great."

So here they come. The test stand is in place, they've all got tables, they've all got their little test stands, they've got their procedures, their pencils, their sharpeners. Here comes the crew, here's the crew [imitates a fully suited astronaut walking around the lunar rover], here's Jim Irwin and Dave Scott, with forty, fifty, sixty pounds of suit, with a backpack and helmet, the gold foil. [Makes hissing noise imitating air flowing through suit]

Uh-oh. "That's not the configuration, guys. It's not configured for test." Everybody starts scurrying. "What procedure is it?" [Scott replies] "But we can fix it, we can fix it. Jim and I can fix it. Jim, give me a hand." "Okay." [Makes hissing noise] "Right here, yes."

They open up their side pocket, pulls out a big, bulky, plastic thing and Jim gets the scissors, they cut it, one plastic bag falls off and of course there's a lot of guys ready to pick up the thing. Then they get the other plastic bag and they pull it out. Raccoon tail. "Right here?" [On the rover left rear bumper.]

"Yep." [Makes hissing noise] You hear this hissing. Put on the tail, they fluff it up.

"What do you think, Jim?"

"Looks good, Dave. It's about right, too."

"Okay. Okay, team. She's configured now."

A cheer. Everybody clapped, everybody relaxed, we had a good test, it was a great day.

Jim had a scar because the technicians, in suiting him up, it was tight to put the circular headpiece, so they got it here and then they just—they had to pull it off again, put a Band-aid, stop the bleeding, put a Band-aid. So Jim Irwin, bless his heart, he's got a scar with a tape. So afterwards, I said, "Guys, I do need a picture, because years from now, nobody will remember, nobody will care, but I will know and you will know." See the far picture?

BUTLER: Yes. There's the raccoon tail. That's great.

REYES: So we had a tail on it. They had a good day. They had an excellent trip on the moon. Last time I saw Jim, he signed that picture up there in the middle for me. He found religion up there. A lot of guys found a lot of things. [Reads from the picture.] "Ernie, thanks for the trip. His love from the moon."

BUTLER: That's great.

REYES: Good friend. Another good friend was Al [Alfred M.] Worden. Al Worden was the guy that flew the command module, and those three were very close to us and we all respected them and we did everything possible. That team worked as a team. Nobody talked about this company or that company, or am I going to be paid overtime for this. We were on a time [line] to get to the moon, we were racing to, first of all, meet the 1969 business, but we were interested in keeping the science going, the lunar thing running all over the place. What's his name, Smotherman, I said, "Jim, everybody wants to do their best. Is there anything that the crew can do for us?"

He says, "Well, the crew would like to do one other thing for you, Ernie, is give you an explanation of the mission. So if we can just get the guys on first shift and line them up and we'll do this and do that."

I said, "I got a problem with that."

"What's that?"

"Our team works around the clock, so therefore we have a first, second, and third shift. If we could get them all, the teams, to come, and if you get your guys to do the show twice a day."

So we hung first shift over, and we brought in second shift early, and they went out in the auditorium and they explained the mission, the equipment, everything they were all going to do. Each one of them had a speaking part. That's Al Worden and he says, "Well, while the ground pounders are down there collecting rocks and doing this and that, I'm going to be housekeeping and vacuuming and listening to some country western, and I'm going to be mapping this and running this camera and aligning the aircraft to this and doing this." He called it aircraft. They were all airplane guys. So he explained what he had to do.

So the night thing, we brought the third shift in early, so they could get it in, so that the crew could get to bed before midnight. I think it was eleven o'clock. So we started their show at eleven o'clock. And Smotherman said, "Ernie, I can do this, but I need a projection."

I said, "I'll borrow, steal, beg a projection. I'll run the projections and the viewgraphs and you run the other thing."

So between the FCDR, Smotherman, and myself, we put the show and the crew were the spokesmen. I don't know if you've ever been to the KSC auditorium, to the O&C mission briefing room, but there were standing people, there were people sitting on the ground. They were just jam-packed. And it was not just the Grumman and the North American; it was Boeing, it was Bionetics, it was everybody that had a contract that did a job. Even the janitors were there and the cooks and the housekeepers. They were all ready to watch. And then somebody asked a question, and I said, "My God, that's an intelligent question."

When Neil Armstrong and what's-his-name landed on the moon and we haven't heard anything about it since then, they were scared to death every time a switch went on and a little pump went on in the lunar module. They were up there on the moon on a strange planet, and all of a sudden, the air-conditioning goes on or the heater comes off or something.

He says, "Well, that's an interesting point you bring," says Dave, "and as a matter of fact, as soon as Ernie and Jim clean up all our stuff that we need to take, we're going to take it with us, the books and stuff, the notes." They had their personal notes they were sharing with us. "But what we're going to do is, we're going to go bed down for the night."

"Al, the candy that he is, he's going to (called him candy ass) go sit up there in the crew quarters and go to sleep in a nice cushy bed, and Jim and I, Jim Irwin and Dave Scott, we're going to sleep in hammocks set up for us in the lunar trainer, in the lunar simulator."

So as they sleep there at night in their hammock, they can hear all the noises that the lunar module is going to be making, taking care of its housekeeping duties—the air-conditioning, the battery charging, the switching on and off of whatever. Everything that was in the sleep mode they were going to be hearing, so that they would rest at night and not be so—if I was on the moon, if you're on the moon, you're going to worry all night! Every time something goes "click," you're going to say, "What was that? Oh my God, what is that?"

You ever get a roach inside a piece of plastic, inside an empty trash can, and the roach is trying to crawl out, and you hear it at night, click, click, click, click, click, and you worry about it. Is it ten feet tall, or is just a little—it's probably just a little weevil, you know, just trying to crawl.

But anyway, they were sleeping in the capsule the last week, just so they would be acclimated, and none of us knew, nobody told us. But they were good enough to say, "Hey, that's how the mission's going to be."

So anyway, the mission went. Apollo 15 was a tremendous success. They rode the...[lunar rover] on the moon. They did an unlawful thing that they later all paid for

dearly. I think they canceled a few stamps and they got reprimanded in the process and that's all, all the good history that everybody knows about. But not everybody knows about the other thing is, as they started to...[liftoff from the moon], they started hearing, on liftoff, the thing takes off, the descent stage is sitting there, the ascent stage takes off, and the rendition is coming from the moon, the Air Force song [sings Air Force song]. "Houston, is that you transmitting?"

"No, this is not Houston."

"Who's transmitting it?" Houston was concerned. Somebody is transmitting the Air Force song. Well, Al Worden and Jim Irwin and Dave Scott—and I think it was Al Worden more than anybody else—had figured out that if you put the tape and played it through the S-band antenna, they would get that song and they would override the voice com and everything else as they took off to rendezvous with the capsule. And Al Worden was by himself in the capsule over there, so he had nothing to do except wait to get rendezvoused with the lunar module. So here comes Dave Scott and Irwin. They've taken off, and they're flying up to meet the command module, so Al Worden points the antenna and starts playing the Air Force song in the capsule.

I was talking to Al one day. I was walking across the Houston campus and Al says, "Hey Ernie! Come on! Let's go for lunch. I'll buy you a hamburger."

I said, "All right. Long time, no see." I said, "Did you survive the banquet?" The worst part of the Apollo mission was the banquet tour afterwards.

He said, "Oh, yeah, yeah, yeah."

I said, "Let me tell you. Tell me about that Air Force song."

He said, "Oh, man. Jiminy Christmas. I played that song. Jim Irwin and Dave Scott latch on to the command module, the lunar module, and here comes the door open. Oh, man, here comes Dave Scott. He was going to eat me alive. 'What the hell are you...?' Jesus, Ernie, I couldn't run anywhere. I'm there in the cabin. He's got me." [Laughter]

So he chewed him out. He says, "God—" etc., etc. "Okay, listen. When the court hears it, and when NASA gets all over our butt, I'm going to take the blame. I'm the commander, it was my mission, I'm the CO. I will take the heat for that, okay?" He says, "Ah, it was a long trip home, man. Here's the CO, he's pissed, and you're right next to him." [Laughter]

They landed, they got recovered, and everybody said, "By the way, that Air Force song rendition as you took off from the moon and everything else, that was wonderful! That was great. It was this, it was that." And Dave Scott's taking all the glory. He said, "And I got my ass chewed all the way from the moon to the Earth, and he got the glory." Nobody will ever know that that was Al that did it. It was an Air Force song. It was an all-Air-Force crew. Afterwards, they had their suited pictures at the Air Force Academy and everything else. But poor Al, he was funny, he was a funny guy. He was a serious guy, he was a good engineer, but he was funny. He reminds me a little bit of Slim Pickens and some of that.

And I had favorites. I mean, we all had favorite guys and gals and everything else, but when Al was relating the story of the Saturn V trip, he says, "Oh, man, what a wild one." And he was sort of a dude, you know. He liked to use the western lingo, the latest English, you know. He said, "Man, what a wild ride. Definitely, like the guy said, an E ticket, the Walt Disney E ticket for the big rides. Oh, man.

When Disney opened, everything was free. My cousin worked for Disney and I went in '55, '56, and they made one big mistake. They dressed teenagers as mice and they had huge heads and skinny bodies and everything else, and all the little kids saw these large mice and they were terrified of them. So then they made a quick adjustment and they hired little people to wear the characters, rather than huge, regular-sized teenagers. But then they started charging—see, there was one charge and all rides were free. Then after that, there was an entrance charge and then you went up for the tickets and you bought the various tickets at the various locations, and if it was a ride through this and that, it was an A, B, C, D, E. E was the biggie, E was the heavy duty roller coasters and all the biggies. A was Mr. Toad's Wild Ride through the dark thing, just in the kiddie carts, you know, and things like that. The Dumbo elephants, the Nautilus trip was a D, and then the E was the number one.

So the crew started talking about, in flight, that this was definitely an E ticket. They referred to it in the lingo of the late Walt Disney, this was the ride of all rides. So I said, "Well, Al Warden, tell me about your flight."

He said, "Well, first of all, you know, you guys strap us down so damn tight, man. Thought you were going to cut off our circulation. And then we sit there, and man, let me tell you, Ernie, I was worried. I was worried about my kids, my wife, my dog."

I said, "Wait a minute. I thought you were divorced."

He says, "I am, but I was still worried about my wife." [Laughter]

I said, "You don't have a dog."

He said, "I know. But I was worried enough, like, if I had a dog, I'd have still worried." [Laughter] Funny guy. He had kids, he had a divorced wife, and he didn't have any animals or anything, but he was worried about his dog and his wife and the kids.

So he says, "All of a sudden, this choo-choo burger starts going. It starts building up, and I'm telling you, if we aren't holding on to something, we are shaking. That thing is shaking us to death in there. I can't see anything. Everybody tells you they can see all the little dials. Ernie, they're full of it. All you can see is stuff like that going in front of your face. The first segment is going like crazy. It is going, and you feel it picking up, picking up, picking up, and you feel your stomach getting really close to your spine, you know. Everybody's real close in there." They're really hanging tough in there, you know. All your innards are pushing back on it. The technical expression is "eyeballs in, eyeballs out." For a positive pressure, your eyeballs go in, for a negative pressure, your eyeballs go out.

He says, "Man, then the engine cut off and the second stage took off, and you are headed for the ride, you know that there is no way you're going to get off of it, and I felt like I was right in front of an engine locomotive with the lights and the numbers and the thingies, and I was just plastered against it, and now it's going as fast as it could go and it was all behind me, and there was no way on Earth I was going to get off. It is just pushing me and then it rolls and I'm looking at the ground because I'm close to the center and I'm seeing that through the window go, choo, choo, choo, choo, choo, green, brown, yellow, blue, all the colors of the Earth, you know, the ocean and everything, and the clouds. It's just going like that, you can't see it, it's too fast.

"So then all of a sudden, it stopped thrusting for the last segment of the ride and when that thing stopped, man, I wanted to kiss that technician's rear end, because I'm telling you, if you had not been strapped in as tight as we were, I felt like my head would have gone right through the instrument panel as well as my body and everything else. So a word to the wise, I tell these guys, the tighter, the better."

So here was a guy telling us something we had never, ever known, that when the thing stopped thrusting at the end, you felt like you were going to keep going unless you were strapped in there. Then after that, everything became free and easy and everything just started floating away, and it was a cool feeling, he said. [Tape recorder turned off.]

The stopping of the thrusting. He told me that story and he bought my lunch. We did have a hamburger at his office, and he told me about all the good things that he had done and he told me how he just let everything go on. He was eating sandwiches, and the food crumbs were all over the place, and then when it got really close to come home, he said he really had to hump it. He had the vacuum cleaners going, so they could take up all the particles and then he switched it all.

But he was really proud that he had set the tape and figured it all out. He says, "I'm not a rocket scientist, but I figured it out all by myself how to play tape, to transmit." Then he got his butt chewed and then they got back, nobody said anything. He says, "Typical NASA, nobody said anything, and then somewhere along the way, somebody congratulated Dave Scott on what a great thing he had done and everything else." So Dave took the credit and he got the ass-chewing. So it was funny.

There were so many instances of stories where the guys had done some good, either for the people or in general for the workers. We started talking to them, we would invite them to talk to folks or just to meet them, just to let them know that they were there, and then after a while, the crew themselves started this manned space awareness, and they started meeting with all these guys and everything else.

One thing that started with the first one, Apollo 1, we had a problem that every time we would power the system up, telemetry would go wild at about so many thousand feet. It

would just get all cluttered up. So we tried to pump down and we tried to pump down and we tried to pump down, and we put out a detailed schedule on all the work to do. Finally, there was nothing else to do with the twelfth time. So I drew a little bell jar. You know what a bell jar is?

BUTLER: Yes.

REYES: And then I drew a little Snoopy hut inside, and I said, "Well, let's go for it, and let's hope it works this time." The bell jar was nothing more than the bell jar that looks like that, that's usually like that, and it's got a handle on top, and then you put it in, and anything that you want to pull a vacuum on, you put it on the inside and suck it down. So I drew the Snoopy hut and then I drew the entrance and I drew the old dog dish for Snoopy and I drew a couple of bullet holes, due to the fact that we had tried and I put the date and I put this thing over the house. And I put it on a sticky paper and I put it on the schedule. "Hey, we're going for it one more time."

Then I started drawing little Snoopy and I would draw Snoopy not as [Charles] Schultz had him. Schultz had not developed Snoopy too much. He hadn't even done him with the Red Baron or anything. He was just a pup that sang and wiggled its ears. What I did is, I drew a Snoopy, I always put a nose and I always put goggles on him, because he was an aviator and he was, per se, one of the guys or one of the gals, and I always put a scarf on him, and then I put his little hands to do whatever it is that we were doing, and I went ahead and put feet, tail, grass, and I'd draw whatever was required, and you saw how long that takes to draw.

So we started putting Snoopys on the schedules. At the end of that first schedule, the...[North American contractor scheduler] says, "Ernie, do you mind if I collect them and put them on the book?"

I said, "Yeah, if you want to, Al." Al Tinarello was the guy.

So what happened is, we created a communicative device. We would put the Snoopy on the schedule and we would use events happening to the technicians on a daily basis, and then we would say, "By the way, this is what we need to do on the schedule today, and then when you get this, jump to this and color yours, first shift in blue. You second-shift guys, color yours in red, and third shift, you pick a yellow, orange, whatever color you want, so we can know when what part of the job got done. By the way, tell us anything that might have happened that we can record, because we want to understand what's going on."

So after a while, it became a communicative device. The people wanted to know what Snoopy was doing, wanted to know what was going on with the technician workforce and what was going on with the management, because we poked fun at everybody and everything. At the same time, the...[technicians] did something totally unusual: they kept the schedule. They marked up the schedule and they used it. Normally, they wrap it up and throw it away. So it became a communicative device. [Tape recorder turned off.]

BUTLER: Okay, we're back on.

REYES: In 1969, one of the reviews—did that one for the Germans—brought up Snoopy. They gave Schultz, obviously, his due reward. The astronauts talked to Schultz and they said, "Why don't we try and come up with something?" And they came up with a Silver

Snoopy [Award] and they started doing more of this. And what we were doing was on a daily basis for each one of the capsules that was processing. Here's a story that got written up about it. We drew this little Snoopy on a schedule, and we would make fun of today's occurrences or whatever was happening.

REYES: We started publishing the historical report on the Snoopy and what we did and what we didn't do, and we started including all the various events that happened. We got to the point that we started putting it out in print form. This is the 11 one. Then we went to a print. This is Apollo 12. This is Apollo 14, with the various things that happened. We dropped hydrazine one day. We had a spill on the pad and they said, "Well, how bad was it?"

"Well, it's a thimbleful," says the test conductor to the managers. "It's just a small amount, hardly even noticeable. Just a thimbleful." And our cartoon comes out on the schedule. [Refers to cartoon of Snoopy with Snoopy-sized thimble of hydrazine.]

BUTLER: [Laughter] A big thimble.

REYES: It's a big thimbleful, isn't it? That's a hell of a lot. "Well, Don, only a thimbleful drained down. Looks like you guys fixed it." That damn thing came out in squirts and there was stuff all over the place, but they didn't want to cause a big problem on the hydrazine, and the GSE unit was being fixed and all that good stuff and it was dripping. But it's funny when somebody says, "Well, it's only a thimbleful." How big is a thimble? Nobody asked that. So it was cute and we used it.

We even got to the point that we got the astronauts or the Russians or whoever to autograph them. That's Mr. [Walter J.] Kapryan, our launch vehicle test conductor, the three astronauts, Mr. George Page, and here is a picture of Mr. [Thomas J.] O'Malley, who was the head of the Rockwell guys. The Soviet docking module, the Soviet Apollo-Soyuz and the command service module. And that was the end of that story. So we created these little devices for all the missions.

Apollo 12, we received a very exotic camera from the French that was supposed to shoot super deluxe video, and we told the guys that if you point it up this way, you're going to burn out the element and you won't have any pictures. Sure enough, Pete [Charles C.] Conrad [Jr.] or somebody [Alan L. Bean] picked it up, pointed it to the sun, burned out the element and you have no videos, no camera, no pictures of Apollo 12. But what you do have is a lot of snickering and a lot of going-on.

Apollo 12 landed very close to the surveyor and Pete Conrad went out there and they snipped bits and pieces off of the surveyor vehicle that had landed out there, and he brought it back to us, except that one of the crew members told me that he wanted to do a trick on Pete, so he brought me the cuff checklist, where they have the pictures and the words and the music of the script. They are enlarged now, and I saw these in a book called *Apollo to the Moon* or *Apollo Chapters* or something, that shows one sheet of the pictures that had been put together. [Andrew Chaikin's book *A Man on the Moon* shows a picture of the cuff checklist.]

So what I did is, I took the dates, this is the tenth month of '69, and I added various little caricatures, so as soon as they got to the moon, Pete gets on to the moon, he starts looking and laughing and carrying on about these things. Later on, they asked him what it

was. He said he was looking at the funnies, he was looking at the cartoons. He was in a very precarious situation there. They're out there, on the lunar surface, and here they are, walking around and there they are with their work, so he had all these—oh God, you know, it's time for the second guy to go out and meanwhile there's no more clear sand. This guy has used it all up. So we laid out, and I think somebody put a *Playboy* picture in there or what, but I just was in charge of the pictures.

Pete Conrad still has this checklist. He's offering it for sale, for \$10,000. But I read in the book that they're giving credit to Mr. Charlie Hart [phonetic], the cartoonist, for having done the artwork on the cufflink. I know who did it. I've got a copy of them. I don't have to beat my drum and say, "Hey, I'm the guy that did it." Charlie Hart was hired and he was asked to do a few posters to support the program, and he did these kind of things. We doctored them up quite a bit, but that was his effort toward the cartooning thing.

This was the primary contact so nobody would get sick and things of that sort, but we were always making fun of, "Okay, hey guys, we're supposed to take this experiment up there. How in the world are we going to get that up? Well, maybe we could take it up in two halves, you know." We'd work something in, and obviously, we were, "Oh, no, how are we going to do that?"

So it was a cute thing, it was a funny thing, and it got to the point that the associate administrator at NASA headquarters wanted, on a daily basis, to get his Snoopy cartoon. And after the...[mission] was over, people came by and said, "Hey, man, we need copies of that." Well, we made copies only for the people that were involved and worked on it, and I felt it was a cop-out to go make copies and distribute to the world, so this little cartoon thing was kept by the people that processed the hardware and then we even went into Skylab

Program afterwards, that had worked on it, that had contributed, and done such a wonderful job.

Other folks wanted them and they wanted them bad. I got people requesting, "Hey, give me this and give me that." I can't. They're not for me to give out. We didn't make a nickel on these things. These were for the people that—here's that interview that came out. And this is the kind of cartoons that we put out, about Snoopy and how he did his scheduling. Some of us spent a lot of time doing it. Some of us spent minimal time doing it, and then there were people all over the place that were trying to collect and, "I saw that you have this, please send me that, since I have collected this," and "Mr. Reyes, I'm an avid fan of *Peanuts*. Please send me a copy of this." I'm sorry, but that's not the intent. The intent of this thing was for the people at the time that worked on it and did it.

So one of the things that a lot of people give me credit for. "Well, Ernie, you did the cartooning on it," and I did part of it, then I trained some other guys, because there were six and eight capsules in flow and each one of them on a daily basis, we would put a story about various funny things that were happening or not happening. Sometimes the management liked it, sometimes they were not very happy with it.

One day we...[drew] a cartoon and we were trying to get a car from the motor pool and they couldn't give us a car. And then the...[security] cars that [the security contractor used to]...clear the pad...went around to clear, make sure what was going on, except we had a lox cloud, oxygen cloud, and it's going through, and they drove the car right through it, and it comes out at the other end and it's on fire. So they send another car, and it's on fire, too. So all of a sudden, we send the rescue people running out there and they brought the guys out of it, the cars are on fire, smoking with all that 100 percent oxygen cloud.

So we wrote a little cartoon that said, "My God, we can't even get a car, and the wagon hut is burning them." We got a call from the security chief of NASA, Mr. Buckley. "Would you gentlemen please withdraw that cartoon from the schedule? It's offensive to us."

"Hey, we put that schedule out at two o'clock. It's gone. It's four o'clock, it's gone."

Well, people would get copies and they would make copies and they'd get copies of their own. That particular day, they had those two vehicles that they burned at the pad. That particular day, two cars, in a big hurry at the motor pool, one had gotten washed and the other one had just loaded up on gasoline and they came around a blind corner and they hit each other and they destroyed each other. [Also on] that particular day, a rookie policeman took one of their new squad cars and put it into the ditch somewhere on the Kennedy Space Center. Seven cars were destroyed that particular day by [the security contractor, so therefore our cartoon was really offensive to them].

BUTLER: Bad day.

REYES: Bad day for them, but, hey, don't blame us. We're just looking at the ones burning at the pad, but unbeknownst to us, that's what had happened. When I was involved with the spacecraft program, I had occasion to go attend the preliminary design review in Holland, and I drew pictures of the space lab. They didn't want to call it "Snoopy," so they called it SNASA dog, like the NASA dog, and I drew little funny things of various things that were going on, from the scoreboard, as to whether we were winning or they were losing and we were winning, or whether people were sleeping, or whether people would get up there and just have a good time, bad time, or whatever. I drew the various technical diagrams that we

had, and the various things that they called editorials, and the various places that looked brand new and looked clean and looked spiffy and then there it was.

So it was a fun thing, it was a communication device, and something that really worked quite well for us, and to this day and age, people are saying, "Well, how did that come to be?" It came to be because we started it as a fun thing. The astronauts liked it so well that they convinced somebody that they should have a Silver Snoopy [Award]. Silver Snoopy was born. Snoopy became a symbol. They made little dolls like that up there of Snoopy. They put out the little Snoopy on the dog hut, like you see on the side over there. I used to put the badges and the decal numbers from the various missions on him and just kept him around, so we were good for Schultz making money.

We never asked Schultz for a copyright or anything. We just did these cartoons. I was always afraid that somebody would come by and say, "Hey, Schultz wants to talk to you." Schultz passed away, nobody ever raised hell about it. NASA got permission to draw the posters and make the things that made money for the man, so we let it be.

And people would say, "Ernie, you ought to publish those things." Those didn't belong to Ernie; they belonged to all the people that did all the work and did all the devices. Things that we made, we poked fun at management, we poked fun at the technicians, we poked fun at managers, engineers and whatever. We had a place where they were closing out a sim bay—one of the bays on the service module for one of the missions—and we got everybody there, including the BSA, janitors and BSAs and guys with brooms, and somebody said, "Well, who's BSA?" It's the Boy Scouts of America. I mean, we had everybody looking at us and everybody working with us.

We had a test conductor and one of the senior managers was sitting on the headset back there, listening, and undergoing the test and we're counting down and he's making copious notes. You wonder what these managers do. The manager that was sitting next to me says, "Ernie, I want to tell you something, and you ought to use it, but I'll disclaim it."

I said, "What?"

"The guy is about four minutes away from launching, we're counting down, his wife calls him and she wants him not to forget that on his way home, he's supposed to pick up some milk, some bread, some eggs, some bacon, some fruit."

Suspicious confirmed, right? You always think, what are these people doing, so high and mighty? Hey, his wife was giving him his marching orders, "On the way home, pick this up." Here's a guy that makes \$100,000 a year, he wears a suit, he's committing for a company [to launch], and his wife, "Yes, dear. Okay, dear. Yes." And the guy was watching him and he—

BUTLER: He's writing the grocery list. [Laughter]

REYES: The grocery list! [Laughter] For God's sake, that made one of the Snoopy cartoons. And we had Snoopy that would go in behind a management door and he'd come out and then we'd draw him with his ass chewed up, you know, that he'd been hit. The big guys had hit him like a fish. So Snoopy became an integral part of the process, because he depicted the day's events. That little Snoopy went all the way to Washington, DC. It went to Europe. People wanted copies of him. We only made copies for the thirty, forty people that were

directly involved with it, and then other people made copies of copies, and after a while, you don't stop that. Anybody that's got a copy machine can go to town.

But we never emphasized, and we never made a nickel on it, because we never sold these things. We always kept them. I got people that say, "Sell me this," or, "Give me that," or whatever, and I got people that, when they introduce me, they'll say, "Ernie, you know, Ernie used to do the Snoopys on the cartoons." Ernie used to do a lot of things. Ernie was involved in a lot of things.

Ernie got hired last year by a gentleman who was project engineer in California. He remembered how we went and cleared out the hardware and got it to flow and got it to go during the early days and he asked me, he said, "Ernie, do you still do the kind of work you used to do in the sixties?"

I said, "Yes, sir. Absolutely."

"Do you think you could do this, that, and everything else?"

I said, "Absolutely."

NASA has always had a few good troops of all kinds, they just never got a chance. The newspaper and everybody said, "Well, NASA has lost this," or, "NASA has lost that." NASA never lost anything. NASA has lots of people, that all they need is an opportunity to go out there and do, and they're there. We've got a younger generation now, but they're just as capable and they're just as full of the life and full of support for the programs as anybody else.

So the guy says, "Well Ernie, I want you to come up here and interview our company." I went and interviewed the company and they told me what they were looking for and everything else, and afterwards, he said, "By the way, what have you done the last fifteen

or twenty years? What have you been doing?" He was concerned with what capabilities I had had in the past that they needed to help them with their program, the Kistler [Aerospace, Kirkland, Washington] project of a rocket ship being built and launched out of Australia for commercial satellites, and he was concerned about the quality of life that I had led, and the investigative processes that I had been involved with on the various Air Force failures, the various NASA redesigns, and all that good stuff.

So it was very interesting that people still remembered what I had done rather than what I had drawn. I got involved as a troubleshooter. I told you about that. They sent me to get involved on the rover. After the Apollo Program and during the Apollo Program, I had flight crew equipment, which is everything the crew used. I was still responsible for processing the flight hardware.

Then I got involved with the Skylab, the stowage part of 5,000 items of stowage, and I got involved in playing dice with Marshall and JSC [Johnson Space Center] as to which came in with the recovery system for the Skylab. We launched Skylab, and one of the wings tore off on flight, so we had a thing to stick in an airlock and expand like an umbrella to cover it, and it was up to us to get it stowed and get it received. I was waiting on Marshall versus JSC, who was going to have the delivery items here first, for us to stow and launch? We played traffic cop with helicopters and fog and lighting up Patrick, which closes at sunset. It closes; it doesn't have lights. So we had to provide lights, just like in the movies, where you park the vehicles with lights and all that good stuff.

So there were a lot of things that some of us got involved with. We went to Huntington Beach. I sent one scout and I met with the scout, and we were supposed to stow

that for flight and get it ready and get it this and get it that, and when we saw that it wasn't possible, we laid out some different planning on a hole here in the side.

I got to work with and meet with an astronaut who was later to become hot stuff, but he doesn't remember that anymore. He has forgotten all those days. We would go to east L.A. and get Mexican food and he would drink a few beers and we'd all talk, and he claimed he was a three-time loser because he had three daughters. He had been on a program with NASA and he was now going to bid on a—he'd been on a program with the Air Force, he had lost out in the military and now he was going to go with NASA, but he was a red-shirt astronaut, third-shift astronaut. That's what he was doing. We talked, and we said, "Hey, man, keep your chin up, you're going to get there, it's going to be okay, you're going to be a hero one day, and you'll forget all of this stuff. This was part of the chapters in your life where you did a good job for the government."

A project engineer who felt like, oh, God, nothing is going right. We promised him that if we did it right and recovered, he could buy us a steak dinner. He later became vice president of Lockheed Corporation. Never paid his steak dinner, by the way. But he was a good-time Charlie, but we told him, "Just be cool and we'll show you how to get there."

We had 5,000 items of stowage to do in that workshop and only a limited amount of time and resources. So we cheated and we loaded things as soon as we got them, we did bench reviews with the crews, examining various bits and pieces, then we started partial put-aways and things like that, so we'd get done in time.

There was a gentleman named Bill Snyder. He was [the Skylab program] chief from NASA headquarters. Good man, honest man. One day he and somebody else were touring all the various things going on at the VAB. We had a floor where we had all the equipment,

we had everything that was frozen in ice chests, had a walk-in ice compartment, and we had all the equipment. We had a schedule about as big as this wall, where we showed all 5,000 items stowed and when they happened and when they got reviewed and when they got checked, and when we fitted the gloves to the suits, and when we fitted the suits to the astronauts, and when we fitted the tools to the toolboxes, and when they put everything together. We gave an explanation of the whole thing, and I think that's one of the best compliments I ever received.

After we finished, Tom Howe [phonetic]—we planned and operated how it was going to get done—he turned around to the guy that was with him and he says, "You know what?" He says, "What?" "Let's get the hell out of here. These people appear to be the only ones that we've seen all day that know what they're doing, so for gosh sakes, let's get the hell out of their hair and let them do it."

Bill would write me a letter and he would say, "Ernie, I'm still taking bows and accolades for all the tremendous work that you and your team did. We really appreciated that." And along the way, they threw hero medals and certificates and stuff for you, for all the various things that you had done. So I was a troubleshooter on that particular one, with flight crew equipment that eventually we got to keep over here.

Another little thing that we got involved with. My boss, Dr. Kapryan, called me one day and says, "Dr. [Kurt] Debus wants to see us."

I said, "Well, he doesn't need to see me. He doesn't know me very well."

He said, "No, Ernie, he knows you. He knows who you are. We're going to go see him."

Walked in there, he had his tea set and he had a black employee that was his personal valet kind of thing, up on the fourth quarters. Dr. Debus was of the old, aristocratic school of layers of commanders and layers of workers, and Dr. Debus, him and Dr. Gruene and Dr. von Braun and all these other folks were in the original rocket engine shop in Huntsville, and he took care of Kennedy. He says, "I have a problem, and you're going to help me. I got a call from Dr. [Edgar M.] Cortwright. He is Langley director. They're managing a project called the Viking Program. They're in Denver. They're supposed to launch an Air Force Titan [with the Viking capsules] and they're not doing too well, and they need our help, so they asked us to send them some help. They need somebody to help them troubleshoot, an expert, efficiency expert, processing expert. Whatever you want to call it, they need help. So, Kapryan, I want you to send somebody. Is this the somebody?"

He says, "Yes, sir. I propose that we send Ernie up there and find out what's going on, and put things right."

He says, "Well, good, Ernie. Have some tea and have some coffee," and we all sat there and chit-chatted and we left.

I said, "What do we do?"

He says, "Well, Ernie, get your ticket and as soon as you get your ticket, go up there and spend some time and then you come back and tell me what we need and what's needed, etc."

I said, "Okay. How much time have I got?" As John Wayne would say it, you're wasting daylight.

...[The] Viking Program was meant to land on Mars. It was meant to land in the year 1976, and somebody thought it was a good idea, why don't we land on the Fourth of July?

What a splash. Hey, what a deal. Bugs Bunny would like that. So we said, okay. So that's the plan. So I said, "Kappy, what do I do?"

He says, "Ernie, go out there, find out what the hell's going on, see what we need, and then we'll come back and talk to the man see how we can help."

I said, "Okay."

So I went up there and I met some people, talked to some people, saw what was going on. I was very disappointed in what I saw was going on: engineers doing this, technicians doing that, six floors in a big building in headquarters, the sixth floor not knowing what the third floor is doing, where all the engineers are, not knowing what the first floor does, who does the scheduling and obviously not knowing where the time and charges are going on the fifth floor, which charges the product.

Then they started doing the job, and basically the way of doing business was completely alien to my way of thinking. Martin engineers would gather in a conference room every day, in Denver. They would call, telephone, to Langley, Virginia, and find out and say, "These are the problems we have. Problem one, two, three, four, five, six, and then this is what we think we're doing. What do you think we need to do?"

The NASA people [at Langley per Telecon] would say, "Well, on problem number one, we haven't figured out what to do there, but on problem number two, we think you ought to do this, on problem number three, you need to do that. Problem number four, we'll have to think some more," and then just hang up.

Then the next day, they'd have another telephone call, and this, that and everything else.

So I said, "Something's wrong here, something's very wrong. Why isn't there a NASA team at the factory, working with these poor people and get this stuff done?" So I came back and I said, "These are the programmatic things that I see. This is how I think we can help them. If we form a team, if we go in place and if we supplement whoever it is that's going to do it, it'll work."

So everything was quiet for two weeks, then we get a call from the front office and Kappy says, "Okay, Ernie, it's time to go do some work."

I said, "Okay."

We went over there and Dr. Debus says, "Well, it's a good plan, Ernie. JSC has copied it. JSC has offered to help and JSC is going to be helping Langley do their work, but they need us to help them. So you go up there and talk to this man, and find out what it is. Now we can help him, because, we as an agency, have got to pull this thing out of the fire. Viking Program is going down the tubes. It's a multibillion dollar project that's going down."

So I went up there and I went to see the resident office guy, and there was an old buddy of mine, and he's got some skis, and he's waxing the skis. I went to school with the guy, in college at New Mexico State University. And I said, "Okay, well, how can we help you? What do you need from Kennedy?"

He says, "Well, what we need from Kennedy is a test and checkout team, the good systems engineer that you sent to St. Louis and to California on the capsules and Bethpage, New York, to come down here and take over the test and checkout of this thing."

I said, "And what are you going to do?"

He says, "Oh, I'm here for the ski season, and I'm here to make sure that JSC manages this properly, with KSC people doing all the work."

I said, "You sorry rascal." He was waxing his skis. He was there for the ski season. That was the last conversation I had with him.

Then I went back and I reported what was needed, and they said, "Well, okay, you need so many people and you need to develop a team, a philosophy, a test and checkout and rapport with the Denver folks up here. So I tell you what. You pick six, seven, eight people—under ten. Whatever you think you need, and then I will cut orders and we'll send them up there and we'll send a team and we'll start working."

I said, "Yes sir, Dr. Debus. Yes sir, Kappy." I said, "Kappy, how long have I got?"

He says, "Give me the names of the people before close of business today."

I said, "Oh, man." So I called some buddies of mine and I said, "Harry, would you like an opportunity to do this? We're going to do this, we're going to that." "Wayne, I need you to do this." I picked seven or eight guys, and I told them my story, and I asked him and I needed an answer right away quick.

"When?"

"Within the hour. Call your wives. I need to know because we need to leave this weekend, and today is Wednesday."

So they said, "Okay," so they all made calls, and before an hour was over, I had commitments on everybody and everybody wanted in. Nobody [I asked] turned it down. It was the time when people were planning the shuttle and planning this and planning that, but here was an opportunity to go do some work.

So I took the troops. We went up there, and I said, "Okay, here's our job. We're going to help these people any which way we can. One thing we're not going to say is, 'This is not how we do it at the Cape.' We're going to see how they do it, we're going to offer

suggestions, and we're going to help. If they want you to help pull cables, you pull cables. If they want you to help them write procedures, you write procedures. If you want them to help...test conducting, you're going to do that. But we're here to help, and we're here to better the product and make sure that NASA gets its money's worth. In the meantime, I've been commissioned to work a paper and report to some higher echelons as to how to save this program. So, guys, believe it or not, we're here to save the program. One ranger, one guy."

So I took a buddy of mine [Wayne Stailard], and he and I worked back to back, twelve-hour shifts, listing what needed to be done and what could be done and what might be done. In the meantime, our guys started helping them. Computer guy, Gene Nelson. I said, "Gene, here's our computer. The Houston Police Department has donated this computer. This is what they're using on the mission. It's an executive-type program, such that it runs, it gets there, it fires, it goes in a circle, it drops down, it opens the parachute, it releases the parachute, it starts the engines, it comes down, it cuts the engines, it lands. The next thing it does, it extends an arm, gets a shovel, gets dirt, brings dirt, drops it in the conveyor, checks the amino acid output to see if there's ta-da. It's one step at a time, it's executive. Opens the camera lenses and starts shooting pictures, starts taking slices. An elephant could walk by and the camera wouldn't take it because all it does, it takes the slide digitally and it takes eight, nine, ten minutes to transmit from Mars all the way back over here. So this is what we got to do. You're in charge of helping these folks with that computer."

He says, "Not a problem."

Four days later, I went down to the lab, and I said, "We've got to have a meeting. Where's Gene?"

"Well, Gene's working."

"I'll go see him. Hey, Gene, I need some...Gene! What the hell are you doing?"

He said, "Man, I'm busy, Ernie. I can't talk to you. I'm patching, because I'm getting ready for this test, I'm getting for that test."

I said, "Where's the three guys that work here?"

He says, "Well, one quit, one is at home because his daughter is sick, and the other is on travel and won't be back for three days, so I'm responsible for patching and cutting the code and unpatching the computers to support both vehicles' testing and things like that."

I said, "Gene, we're supposed to help them!"

He was in charge. He was in charge of the computer lab, which was as big as my house, and he was running around. He had two tests and he was patching, switching and hooking up the computers on a board. The man is a computer wizard and that's what he likes to do. Okay. But there he was. That's the kind of guys we had.

I went to see Harry and I said, "Harry, what are you—Harry, you look like hell. You've got grease on your shirt."

He says, "Man, Ernie, I was in the trench and the guy said, 'Help me,' so we went to pull cables and we're pulling cables here and we're pulling cables there, and I pulled on this big old cable off this flying saucer ship and it arced the biggest, most beautiful ark."

I said, "You unplugged it while it was powered up?"

He says, "Hey, we didn't know."

"Okay, keep helping. Everybody keep helping."

One day the guy comes to me and says, "Ernie."

"Yep."

"I need help. These are the tests that we have run, and the gentlemen have signed off the paper, but we don't know who they are. Could you give us a hand?"

"Sure. Sure, no problem. What did they sign?"

"Well, the guys know him. He's a hell of a nice guy and everything else. Salipo. No, no, no, no, no, no, no, no. It's Harry," and his last name is, I'll think of it here.

"But anyway, what's Harry done?"

"Well, Harry signs 'Snake.'"

"Oh, that's because we call him 'Snake.'"

"Well, he signed on the...[test procedure], S-N-A-K-E, snake. And it's not, it's Harry Salipo."

"Okay, I'll tell him to use the real names. Who else?"

"Well, who is Soapy?"

"That's Linn Barnett [phonetic]. He signs 'Soapy' on everything."

"Okay. What's the next guy?"

"Snake, Soapy, Possum."

"You're kidding."

"No, sir. It says right here, 'Possum.'"

I said, "That's Bascom Murrow III, an aristocrat from Georgia. Has an estate, has money, and he likes to be called 'Possum,' but he is Bascom Murrow III." Possum. He's signing "Possum."

Who would believe the history of NASA, where we had test conductors in Denver, testing the ship to go land on Mars, with a name like Snake, Soapy, Possum. Unbelievable. Isn't it unbelievable?

BUTLER: Yes, it is.

REYES: We put the names right, and I went over there and I said, "Gentlemen, we must have the correct names, okay? No more of this fun stuff, because these are all part of the records."

"Oh, shit, Ernie, we didn't know you were that serious about it."

I said, "I'm always serious about everything."

We proceeded to check the vehicle out. I proceeded to write a white paper. I was called one night and Kappy says, "Ernie, I'm in town and we're ready for your white paper. I've read it, and I think you should present it."

I said, "Well, what do you think? Should I fix it or anything else?"

He says, "Reads fine."

I said, "It's not the best piece of work I've ever done, Kap, and I asked a lady to type it for me, because I don't type."

He says, "Ernie, just go over the points that you have, and make an outline and highlight it and bring it up, and especially on what we need to do."

I said, "Okay. Who can I expect to see?"

He says, "You just show up. I would look sort of halfway presentable."

"Shirt, tie?"

He said, "No, shirt and tie is fine. You don't need a jacket."

I said, "Okay. Will do. Yes, sir. Where?"

"Well, you go to town, you go on the outskirts of town, take Highway..."

I said, "Nobody goes that way, Kappy."

And he said, "There's a motel there by the name of so and so."

I said, "Are you sure? You don't mean one of the nice ones?"

"No, no, no, no, no. That's the motel we want you to go to."

I said, "Yes, sir."

Typed my paper, had supper. I had my wife up there for that time. I took her up there for a little bit of time. And I said, "I've got to go to this motel."

"What is it?"

I said, "It's a no-tell motel. I'm sure they rent by the hour, because it doesn't look very nice."

So I come up to this place, and I see a few nice-looking cars and I said, "Well, they said room so and so." And I walk in. I walk in to a dark room. I hit the light, and I close the door. There's my boss, Dr. Debus, there's the associate administrator for manned space flight, there's the associate administrator and controller of NASA, there's Kappy. Jesus Christ, I had only seen pictures of these people I didn't know. And he said, "Okay, Ernie, tell us about it."

"Yes, sir. Can this program be saved? Yes. How do we save it? Do we do this or—no, none of the above. The way you save it is, you curtail. You had six capsules. We need to do away with the thermal vacuum thing and keep it for spares. We need to concentrate on the three that we have on the floor. We need to get all these spare parts to these three. We need to concentrate on the two in test. The one is almost ready for test, and do away with the other three, as far as spare parts and cables and GSE and slings and this and that. We need to assign a team, a manager for each one of these from the Martin Denver. We need to assign a

NASA guy that will assist him. It could be a Kennedy person or it can be a Langley or it can be wherever.

"The problem, though, is Langley needs to move their team to here. We are working with eight people and we are supporting them the best we can, but they need some more NASA support to sign their paper and agree to their engineering. We need to eliminate this because it costs too much. We need to eliminate this. You'll save two billion. If you can eliminate this, you can save four billion. We need to eliminate these services, not required. I don't know what these people do, but they're not needed. All we need is a manager on the top, the engineers on the third floor, the schedulers on the first floor and obviously somebody's got to keep their eyes on the spending of the fifth floor. I would suggest you fly in an audit team from the headquarters area, and if not from them, from the Defense Logistics Agency."

I mean, I went down what needed to be done and what needed to be—I mean, from the cable, you have one cable that both vehicles are using. The cable that is broken has been in the warehouse for three months. The part that it needs to make it work has been there two weeks. Nobody's working on it. They schedule but they don't have a scheduling room where they know what they have to do every other day, and this and that.

I must have talked for three hours, and they had questions. They were asked and I told them answers and stuff. It was in a motel room, and they were there and they were asking, and when they were said, they said, "I think we have enough. Ernie, we thank you very much for your time." They didn't tell me not to say nothing, so I'm saying it.

I said, "Okay. Kappy, Dr. Debus, see you around the campus. See you later, chiefs."

I walked out, got in the car, and I said, "God Almighty, what the hell have I done?" I left them the white paper.

Sure enough, the next day, Dr. Petrone, associate administrator for NASA, walks into the Martin plant. Everybody's at attention. They've got a room full of engineers, they've got a room full of all these other people, and I'm sitting over here in a corner. I'd been talking to a lot of the guys. I was not just doing it by myself. I kept asking people and I kept asking my partners, "Is there a better way? How about this or how about that?" I always ask the people that know how, and then modify it, and then you propose Plan A, B, C, but you always have Plan D ready, which is the one that's going to work.

So I sat there and they talked, and the Martin guy says, "Well, Dr. Petrone, we're here today to tell you about this and we're here to..." And Dr. Petrone, you got to understand the doctor, how he was. He could be a real bear. We used to call him the big ACM. ACM: ass-chewing machine. I mean, he got up there and he says, "You're not going to tell me a thing. You're going to sit down, you're going to be quiet, you're going to make notes, and I'm going to tell you what you people are going to do. First and foremost, you're going to eliminate this vehicle, you're going to..." Right down the script. Holy shit. "You're going to..."

"Well, that'll cost less."

"I didn't ask what it's going to ask you or anything else. I'm just telling you what we're not going to pay for anymore, and what we're going to eliminate and what you need to cannibalize, and what you need to do this," and he went right through it. Beautiful. And he says, "And I want a report in a week on how you're doing on these, because if you can't possibly do these, it will not take very long for the Congress of the United States to eliminate 4.8 billion dollars that they've invested in this project. We want it, we want it to work, but

we're not going to continue paying and we're not going to continue to see this slip and slide. In the meantime, Langley will have a team here by next week." I mean, he was telling them what the hell was going on. The Langley folks didn't know jack. The manager had shown up from Langley and here's there, you know, like, I'm going to, "Hey, they're going to talk about my project."

Man, he was telling them what he was going to do and he was going to that, and this and that. Later on the QT he said, "And when you're ready, you talk to that man and he'll tell you what you need to do." Oh, Jesus, I figured like I was being fingered as the guy that had done everything.

So all this is going on and he brings out a particular and he says, "And by the way, I'm not going to be paying for two vehicles to be checked out with one cable set and this and that, knowing that there's another cable set."

About this time, a gentleman in a shark-skin suit, worth about \$600, I figure, distinguished-looking gentleman, gets up and he said, "Excuse me, Dr. Petrone. Let me ask a couple of questions. Are you telling me that we have one cable that you both are sharing?" These are both spacecraft managers. Both of these guys I knew first-hand because they both had worked on the Grumman program. One was Dick Cook and the other one was John Adamoli. I knew them; we were buddies.

And they said, "Well, we're sharing the cable."

"You are sharing one cable? By God, we've got this whole building. We've got thousands of people on the payroll and we are sharing one cable. Didn't we buy two for the program?"

A little voice from the back, this little old guy stands up, "Yes, sir. We do have two. We have one in the warehouse but it's got a broken connector."

Another guy stands up, "We have a connector and it's ready. We could hand-carry it over within the hour."

He says, "That's exactly what I'm talking about. You people couldn't find your ass with both hands. You get the cable, you get the connector, you fix the connector, and you guys have two cables for two spacecraft. This is ridiculous. How long has this been going on?" Six months. I'm telling you, Langley didn't know how to manage. They didn't know the concept of putting a NASA team in place to make it work.

So I was the ringleader. When it was all said and done, we processed the Viking, we brought it down [to Florida], we put it on the autoclave, we launched two of them, they both landed on Mars. That's the very vehicle that landed on Mars that sent pictures of the blue sky and all that good stuff, and the red dirt. [Recently,] there was a big splash made about this little crawler that went out there. This [Viking, to Mars] was a big ship, this was a big science project. It was not just a science project. It was an endeavor. And it landed on July the Fourth. Whew!

But when it[s] all said and done, they gave certificates out to the launch vehicles people who had done...[the Florida checkout], they gave certificates to some of the Langley folks. They recognized some of the people, but they didn't recognize any of our team that went out...[to Denver]. Not even a thank-you. But you don't expect that, you know. We were there to do a job and we felt good knowing that, by God, we were there, we know about the arm, we know about this and everything else, and they listened to what we had to say, and that's what had counted.

Here is a company, this huge company, they're working on the Viking, and there's one guy, only one, that is allowed to handle the manipulator arm that's going to go out there. And we said, "No, you ought to have one person per shift so that we don't have to schedule around that particular person." You know, common sense kind of things, you know, guys. So we said, "No, you ought to suggest this and that."

Sure enough, the next day, the one and only that could handle [the arm] trips and drops the arm. No damage was done, but he dropped it. Just the fact that he dropped it. Man, the next day there's a school for twelve guys on different shifts. And all they had to do was listen a little bit.

We had fun and we had enjoyment and we had a lot of fun time with the guys, but it's just things that happened because we had a dedicated bunch of people, either from here or from Houston or from wherever the NASA installation is, because there are so many good NASA people willing to step forward and take [the challenge].

I don't know if this is what you've heard from your other interviews or not, but basically we had some people that joined an agency because it was a can-do, must-do, will-do, and there was a spark of fire. The president had ridden behind it, he had gone on, the torch had been passed on, we had done some tremendous things with the manned programs, but there were things to be done with the unmanned program.

We did the same thing with the Apollo-Soyuz Project. We brought bits of pieces of the Soviet things and we learned to work with the Russians. We worked with the Russians, we shared with the Russians. They have a cartoon, just like Bugs Bunny and Mickey Mouse. They have a hare and a—let me see, it's like a coyote, and then something else and they've

got names. I learned how to draw sketches, and when the Russians were here, we communicated with them and had fun times and parties.

The Russians were unique. We met them, and even though we knew there were a lot of KGB folks, they're quiet. We used translators because none of them could speak the language. To start things off and get a warmer-upper, several of us were invited to get on a bus and go to Disney with them, so we got a bus. I waved to my wife and this one guy says, "Is that your wife?"

I said, "Yes, that's my wife."

He says, "She has her own car?"

I said, "Well, she has her car because she has to run the kids, and we go to the beach. We started out with a Volkswagen but we made too much love so now we have too much junk. We have a cage and we've got a bike and we've got toys and we've got three girls and they've got to have their own space."

And he says, "And you have a car?"

"Yes, I have a car. That's my Volkswagen and that's her car."

"Her car's bigger than yours."

I said, "This is just [for] me [to] go to work. I just go to work. She has to go buy groceries, she's the nurse, she's the housekeeper, she does everything, so she needs her car."

"Oh, okay. You have three daughters?"

"Yep, three daughters."

"You have pictures?"

"Oh yeah, here's my picture." One guy.

"And what do you do?"

I said, "I build model airplanes, I collect coins. My father used to collect coins. Starting with World War II, he collected coins."

"Oh, so collect coins."

"Yes. You have any Russian money you want to trade?"

"Oh, no, no. Not allowed to trade money, Russian money."

I said, "Okay."

We went to Disney, I had my camera, and I...[took] a bunch of pictures. I have a darkroom in my garage, next to the airplane factory, and I came home and I developed the 35mm prints, and I put the chemistry in. I spent an hour or two and I made up some pictures of all these guys with all the Disney characters and everything else, and I put them in an envelope, in my little briefcase.

I went to work the next day. We had our scheduling meeting as to what we were going to accomplish and everything else, and then I said, "By the way, yesterday, I thoroughly enjoyed it. I hoped you all enjoyed it." All this through a translator. "And here are some pictures of some of you guys that you might want for your scrapbooks."

There were eight-by-ten glossy pictures of them with Mickey Mouse, with the Europeans, with the two astronauts and cosmonauts, with everybody that was on, and oh my God. "You did that?"

"Yes."

"Last night? You have a factory, you have a capability?"

I said, "No, I have a hobby." So I do. I don't do color. I send color off, but I do black and whites.

They said, "That's fantastic. You do this."

Proceeded throughout the process, everything was cool. We got together, and we had conversations with some of the Russians. I told them this was the center of the universe, and one guy said, no, Leningrad was. I said, "No, see all that shrimp you're eating? See these beautiful navel oranges and shrimp? Navel oranges and all this crab, that comes from right here. We just pick it up out of the water. That's why this is the center of the universe."

He says, "You live here?"

I said, "Well, I live in a little town called Titusville, but it's the center of the universe. That's where we come to work and we go there to sleep."

And then he finally caught on and he said, "No, no, no. Leningrad's the center of the universe."

I said, "Well, do you have navel oranges?"

He says, "No."

I said, "You have big shrimp?"

He says, "No, but we have other things."

I said, "Like what?"

He says, "We have art."

I said, "Well, you have art that has traveled there, but it wasn't painted there."

He says, "You have point there. We discuss later."

I said, "Well, okay. No problem." All of a sudden, some of them started speaking English.

When it was all said and done, the Russians invited several of us to attend their farewell party because they were going to go on and the mission was almost over and they

were going to go back, so we launched and they launched and we rendezvoused. They invited several one of us and they...[gave us] a paper sack. I said, "What is that?"

They said, "That's for you."

"Yes?"

"Oh, yes, that's for your three daughters." How the hell does this guy know? The guy I talked to is way over there and he's been gone a week. "This is for your three daughters. This is for the oldest, this is a little bear, and a little plastic cosmonaut and a little log cabin church, whatever. And here's some slides for your wife and here's a record of some music your wife might enjoy. And by the way, here are some coins, paper and coins, because you collect money," and this and that. Jesus Christ, in a very small conversation, they knew all these things about little Raul there.

The chief launch director steps up to me and says, "Ernie."

I said, "Hey, Ivanovich. Que pasa?" [Laughter]

He says, "Prost. [Russian phrase]" What was it? *Tovaritch* is "comrade." He started talking and everything else.

I said, "Let's speak English, okay?"

He says, "Okay. We speak English." A non-English-speaking guy was speaking English with me and we were carrying on and he was drinking vodka and they had slices of tomato and sardines all over the place, and oranges.

Imagine if you will, a motel room—a whole motel complex, really—security for the Air Force and NASA had cordoned off the whole thing, and I think there was less than six of us NASA guys there. They had sliced tomatoes, they had oranges and crackers and sardines or anchovies or something, and vodka. They had vodka, just trays of these little bottles. I

mean, it was kerosene, man. No soft drinks, no water, no soda pop, no beer. Just vodka. Man, they're drinking it and drinking it. I told some of our guys, "You better eat something when you drink that kerosene, man. Otherwise, you're going to get wiped out." Some of our guys just fell on the beds.

But I ate the tomatoes, I ate some of the sardines, and I ate some of the oranges and the crackers, just to get something in my belly, because we were supposed to have supper with them, but the supper was whatever they had put in little plates all over, tomatoes and oranges, because they never see them, and they love the oranges from down here. They didn't go get shrimp or fish or anything. They just opened lids of fish or whatever they had, you know.

It was a good gathering, it was a good experience, and we got to square off pretty much, and set off on the right foot for the various programs. So I was involved with that. I was involved with the European effort. They were going to put a Spacelab together and they needed some help. We were supporting Marshall [Space Flight Center], and Marshall was very good at what they did, but they had never done a manned spacecraft, for example, and that's what they were doing, a spacecraft in Europe, with twenty-two countries, all using different-sized fasteners, metrics and whatever.

So I went over there, because they came over here and we showed them how to do things, then they went over there. Myself and a guy named Gary Powers, who had been one of the chief test conductors, we get in a room full of Germans, and they explain how they're going to do this, how they're going to do that, how they're going to do that, which was all totally wrong, because we didn't have the capabilities of what they were talking.

So Gary says—I said, "Gary, be careful. We're in Germany, we're outnumbered. If anything happens, we're history, okay?"

He says, "Okay. Well, I'll be very careful, Ernie." He says, "Well, gentlemen, let me tell you. With all due respect, you guys are full of shit."

I said, "God Almighty. Gary, what are you doing?"

And he went on to explain that you can't do this and you can't do that and you can't do this. So we started talking.

We started working and we started working with two guys, and here is Horse Gorlich and another guy, Udo. Mr. Gorlich, Mr. something-or-other, this and that. So I said, "Wait a minute. Do you know each other?"

"Oh, yeah, yeah, we carpool. We're in the same carpool."

"How long have you been carpooling together?"

He says, "Ten years."

"You still call him Mr. and Mr.?"

"Oh, yeah. Yeah, yeah."

"Just while we're here, can you call him Horse?" Horse Gorlich was his name. And his name was Otto—not Otto Graham, but Otto something. So I said, "Could you call him Otto?"

"Yeah. Yeah, sure. Okay."

So they started using first names, and then we started going out to lunch and then afterwards we started in the evening to go out and have a few beers and whatever. We laid out all the work and we were working very close on how things were supposed to be. We would bring in more people into the circle to work various things.

We were working for the [MSFC (Marshall Space Flight Center), Huntsville], for the European Space Agency [ESA] but we had to travel to Bremen, Germany, where they were putting the Spacelab together, and then they were doing some further things in all the various countries—in Paris, in Italy, and whatever. Our main job was in Bremen. So finally we started getting more people, more people, more people, and we picked up a few words here and there, and we tried as hard as we could to learn the language.

We're getting ready to leave, and some of the guys came to us and they said, "We were not happy with you coming, but now that we see what kind of people you are, we want to bring our counterparts over. We want our engineers that we will be working to come over with us." So we went and reported that through channels, and pretty soon it was, they would come for two weeks or a month and we would let a month or two pass, then we would send two or three over there. They were selected, you know, so we wouldn't offend anybody.

But toward the end, we were, "Hey, Ernie and Gary, they're coming. Hey, party! Let's go celebrate. What can we celebrate?"

I said, "We've got a lot of work to do. Let's do the work first, then we celebrate."

"Okay." In all their offices they had drink. They had liqueur, they had coffee, they had soda pops, they had beer, they had wine, they had all that good stuff, but they never went to excess.

And when they come in here, one day, they get over there and we're in a chart room and we're going through the flow, and a guy says, "I'm thirsty."

I said, "Well, I'll go get us Cokes or something."

"No, no, no. I've got something here."

I said, "Okay." So I turn around, I'm doing this and that, and I look over there, and he's pouring from a liquor bottle into a coffee cup. I said, "Whoa, whoa, whoa, whoa. Harry, close the door. Hey guys, they don't allow liquor out here."

He says, "Why not?"

I said, "Because Americans don't know how to control liquor. They have liquor, then they want to fight, or they want to take your women or something, okay."

"We don't have women."

"No, no, no. You don't understand. We can't drink and work. It's just not done in America."

He says, "Oh, okay. You want us not drink at KSC."

"No, we will drink sodas and we'll drink coffee, this and that. After work, when we're not here, we'll go to Cocoa Beach or Titusville or my house, then we will drink."

He says, "Okay."

I said, "The other thing, please. I notice you guys are stealing all the toilet paper from the janitor's closet. Please do not steal paper. I will show you where the grocery store is. You can buy it very cheap. You can even send it."

"Oh, but we like this toilet paper. I know, but it's free here."

I said, "No, it's not free. See, because if you use it and take it in your briefcase, then the poor ladies and the poor guys when they go in there and there's none, so please don't steal the toilet paper."

History of NASA. European Space Agency, the Germans, the Italians, others, they came to KSC and they stole toilet paper. They brought in wine with parts of their GSE stuff

that was delivered. We would find wine cases and stuff, but you don't advertise those kind of things. It just happens, you know.

So we get to Europe and they decide, it's my fortieth birthday, so we went to the Rathskeller in Bremen, which was a monastery basement down there, where all they had was wine. Wine and cheese. So for my fortieth birthday, I celebrated in Germany with bouquets of flowers and some of our good friends and wine and cheese.

So we had a good time, and we had an excellent program, because we communicated back and forth via cartoons, via meetings in Nordvike [phonetic], Holland. We went in the bitter winter months. We didn't go when it was pretty. And we had reviews and we would spend our time in Germany, and they would show...[us] the ruins of World War II in Bremen, where the bombers had dropped some of the bombs. They left them, the factories, like that.

Then we would work, and after a while, we got to recognize and respect each other for what we had and what we had to offer. We started laying out the Spacelab Program. It was hard to describe for these people what we were doing, and I started building some models in my darkroom, with the peanut cans and the ends, cones off some hydraulic oil, because they looked like Spacelab, and I built balsa-wood things. Since I had always built models, I built...[them]. [Gestures to various models around the room and hanging from the ceiling.]

So then I went to the guy and I said, "Could I borrow two tables and can we put paper on them?"

He said, "What?"

"I'm going to put sticky-back paper. It may be hard to remove, but let me tell you, it'd be worth our while." So what we did, we put paper, I built the walls, then I said, "Gentlemen, I have a proposal. Just pay attention and then you can tell me I'm all wet or we can do this. Let's use these tables and then we'll put the stands on how we think they need to be, because of the cranes and this and that, and we'll bolt the end cones here and the racks here and we'll put the various modules here with the racks going in, with the floors going in, and we'll use the side over here where we'll put the level four, level three, level two, level one."

So for about a week and a half, we had day-long meetings where they would say, "Well, why don't we do this?"

I said, "Show me a picture. Don't describe. Show me a picture on a blackboard."

"Well, if we could do this, we could do this." Then I would take that idea, bring it home, cut it out on a cork frame, cork board, and then glue it with fast-drying airplane glue, and take it and I'd take the model the next day. So when you look at pictures of the Spacelab processing facility and you look at the things that were built, [shows picture in book] it looks exactly—

BUTLER: Sure enough.

REYES: See this thing? See that thing? See the white stands? See the white stands, they were gray here.

BUTLER: That's great.

REYES: So we used the racks, the floor racks on the side, the end cones on the side, end cone there, the Spacelab sitting in all its glory, inside the thing. So this is one thing that I said, "This is how we've got to do it, guys. We've got to do this." So it worked out real well, and the Europeans accepted the fact, and he says to me, this one European says, "Ah, you Americans. In America, you work all the time. You live so you can work. Wrong philosophy. In Europe, we work so we can live."

I said, "The man's got a point." We do live and we put all our life and soul into our work, and then afterwards, some of us don't know what to do. We retire, we don't have things, but that was a very true statement.

We continued working with the Spacelab. Then we had funding problems, then we had all these kinds of other problems, and one time it came, "Okay, Ernie, we're going to go talk to John Yardley. John Yardley does not like what we're doing. He doesn't understand what we're going to do, and he's going to have us for lunch, and we don't know. God Almighty, the whole thing is up in arms."

Here again, we're in a motel room in Washington, DC, and Doug Lord was not there, but we had Ralph Hoodless, who was the manager from Marshall, and we had John Thomas, and we had the manager, John Dickinson, who was the manager for KSC. And I was there as an ops engineer, and we had taken up our chief engineer, Eldon Raley.

[Reading from documentation] "One night, in a Washington area motel, a group of Marshall and KSC engineers discussed some ideas and came up with the basic concept of how KSC space [unclear] process would be handled. The group was led by Ralph Hoodless from Marshall and Jack Dickinson from KSC, and leaned heavily on the creative genius of

(you know who) [Ernie Reyes] from KSC. They conceived a series of horizontal rails and workstands," etc., etc. "After returning home, the KSC Spacelab team developed the concept in greater detail," etc., etc.

We sat on a bed, queen-size, and they said, "How are we going to do this?"

I said, "Guys, so simple." I had learned that John Yardley liked models, so the guys went through that many viewgraphs, and I took two briefcases with these little models. That's why they were built so small. I said, "Listen, guys, this is what we've got to do." And I took the sheets, I took the cover off and the sheet, I said, "We're not going to draw on the sheets, okay, but pretend. This is pretend, okay."

And we laid out the whole thing on the bed, and then we talked and we talked, and they talked, and we talked. I said, "If we do do this, here's the schedule we can do," and I went to the table and I got three sheets of paper, and I laid out the calendar years and I said, "We can do this, we can do this, we can do this, we can do this, and this is a piece of cake."

Elden Raley, our chief engineer, says, "Oh, we can't do that. You know, we've got to get approval. We've got to do this. We've never done this, we've never done this, we've never done this."

And Jack Dickinson says, "Hey come on, guys. Ernie has done this for a living for the Apollo Program for all these many years. If he says we can do it and he can show you, it's as simple as getting it done. We can do it."

So Ralph Hoodless says, "Well, you know what? It's worth a try and it looks like it's feasible. Why don't we go ahead?"

So that's how it came to be. One night, in a hotel room, we gave birth to this whole concept. So this whole book talks about Spacelab and how this and how that, but this one

paragraph tells it all. One night in a motel, in the Washington area. Fantastic, but true. I was surprised when Doug Lord showed me. He said, "Read page so and so," when he sent me this book. He's the author of it and he said, "Send it to all these guys. This is the story of an international success story by Douglas Lord. Here's the copies. Make sure these guys get them."

So I'm one of the guys that got one and he called me and then he said, "By the way, Ernie, read that page and what do you think, and how's my meatball doing?"

I said, "Your meatball is alive and well." I don't know if the back of it says, "To the keeper of the NASA meatball."

But we sit there in front of Washington, the elite of Washington NASA headquarters. John Yardley is the associate administrator now, and they're looking at what are we going to do for Spacelab. I had met John in St. Louis. The first day I was there, I met him, that first morning. So John says, "Oh, what do we got? We got the Mexican comedian."

I said, "No, sir. You got the best that Kennedy's got to offer. It just so happens I'm going to tell a good story today and when you finish here you will be happy that we have spent some time together."

He says, "Okay, what have we got?"

There's Mr. Faenza, the head of McDonnell-Douglas. There's Mr. Rigell, my director, and there's all these highfalutin guys, and I'm supposed to go up there and toe-dance with my pointed stick. And what I did is I took a piece of paper and I laid out all the models in front of me. So he says, "Okay, what are we going to see?"

"Well, sir, we're going to present to you a concept on how we're going to process Spacelab through the KSC facilities, mainly the O&C, the Operation and Checkout Building."

"The building? That's the..."

I said, "That's the old O&C where we did the Apollo Program, command service module, lunar modules, etc. We're using the bay and the cranes to do all this."

He says, "That's terrific. I tell you what. Start it."

"Okay."

So I showed him the main viewgraph. I showed him the second viewgraph and he says, "One thing I don't understand. I don't understand how..."

I said, "Okay, well, let me show you. This is a door, this is a door, the cranes go this way, the low crane goes here, the high crane goes here. This is what we propose. We propose to have a stand here, here and here. This is the main integration stand, this is the Shuttle simulator. We bring in the racks from the experiment rooms, we put them in the racks. We lift the racks, we put them on the floor. We take the floor and the rack and we shove it inside the tin can called the Spacelab. We don't put the lid on yet.

"We put the pallets in the back, we hook in the experiments, the experiment packages, the intelligence wires to here, to the printer, to the computer. We run a test. If it's all copasetic, we disconnect here, we put the end cap on, we connect the umbilicals, and you have it there. We take this then and we lift it and we put it here. This is called our level-one test. We hook it up and we run the Spacelab interface test with the Shuttle and make sure it's going to work. If it works, then we're going to get the Spacelab and put it in a canister, take

it out to the VAB and put it, open the doors and put it into the orbiter, close the doors, take the orbiter out to the pad and launch. It's that simple."

"I don't understand."

I said, "Okay, let's try it this way. We're going to build some tacos, okay? This is where we put the taco shells. Right here and right here. Here we put the meat. You like meat, right? Meat with onions. Okay. Meat here. This is where we put the meat and the lettuce and the shredded cheese, okay? Then we take this, put the paper here, put that shell in here, put the final chili on the top, wrap it up, and from here, we're ready to go into the carton.

"Now what we do off line over here is, we cook the meat, we get the onions and the meat, grate the cheese, chop the lettuce, that's called level four, and then we're building it up there. I can do the same thing with hot dogs. These are the hot dog buns, this is where we cook the hot dogs, we get the hot dogs from here to here. The chili, the chili and cheese with onions, or any which way you want it, from here, and this is the process. You build here and you deliver to the customer here."

He says, "Well, hell, I understand that. Okay, tell me one more time about Spacelab."

"Well, this is a capsule and this is an overall view and this is how we propose to make it." A hand-drawn viewgraph with a stack of finished, polished viewgraphs with all these conceptions, sitting in the back..

They said, "It's going to take three hours."

I said, "No, it won't." So we finished the process of the thing, and I had the drawing up there.

He says, "Well, hell, I understand that, and how much is this costing me?"

I said, "He can tell you. How much?"

"Okay, and how much is it?"

"He can tell you. How much?"

"Okay. And when do you propose?"

"Well, we have a tentative schedule that looks like that, and this is when we think we can get this done, but we need the Spanish rails here, from Spain, and the pallets from Europe here, and the pallets from Great Britain here, etc., etc."

He says, "Goddamn, makes sense to me. Where do we put the sauce?"

I said, "The final sauce goes in the stand where we check it out with the orbiter simulator, so we don't take any time of the orbiter time, so we check it out all in this building, including the orbiter simulator, and then we go right out."

He says, "Yeah, hell, that's great. I understand that. Jeez, that's not that hard. I accept that. I support that. Gentlemen, I support that concept. Looks good. How many more viewgraphs you got for me?"

"Sir, that was the last one we had. We didn't think you needed that many, so we got a few others, but they don't mean anything, so if you're happy, we're happy and we'll call it a day."

He said, "Well, that's great. Well, Ernie, thanks a lot. I understand it. I didn't mean any snide remark about the comedian."

I said, "None taken, as long as you don't throw tomatoes." I'm always quick on my feet with something like that, so he thanked everybody, and he went out of the room, and all of the guys, they were ecstatic. They couldn't believe we had pulled it off and sold the

program, sold millions of dollars on a concept we had given birth to in that room the night before.

BUTLER: A little motel room.

REYES: Hey, babe, that's how business—that's show biz, you know. And then the project engineer says, "Oh, my God."

I said, "Hey, Elden, don't sweat it. That's how we got to the moon, man. That's how we got to Rover. That's how we got the rocks. That's how we pulled Apollo 13 out of the fire. Man, you got to trust people and you've got to use some ideas and you've got to do some creative thinking. You've got to hustle. Hustle wisely, okay?"

So we got done, we went away and everybody thought heroes were made. So we supported that, we supported building the shuttle orbiter. I got a lot of stories on tile you don't want to hear. I was awarded or given a group to head the payloads for both the shuttle and the Deltas that flew out of Vandenburg as well as the Cape, here. And then I worked on the Titan, I worked on the various experiments, and Goddard had some, Lewis had some. They've all had experiments that needed some things.

So we got with Astrotech and we built a facility, and we built more places for doing more payload processing, and we continued to keep the shuttle going. The shuttle was an opportunity in itself. The shuttle came in, it didn't have all the tiles on, it needed a lot of work, and we went and did a thing. They said, "Okay, you, you, you, you and you and you and you, go work on the shuttle."

I said, "But I can't, man, I'm working payloads here, and I'm working payloads there, and everything else."

George Page, my boss, he says to me, "Ernie, if I don't have a shuttle that flies, I don't need a damn payload."

I said, "Very good point. Where do you want me to go work?"

So they sent us off. They sent Skip to be a test conductor, to help over there. They sent a guy, Bill Mahoney, which is an engine guy, they sent him back to work on rocket engines on the shuttle. I had a lot of opportunities, so they said, "Well, Ernie, we've got a special thing for you. We want you to go work over there. There are 36,000 tiles that need to go on that vehicle. You be the tile czar."

I said, "What are you talking about?"

"Well, you be the guy in charge."

I said, "But you've had all these guys in charge."

"Yeah, but it ain't working, so you're going to be in charge, and you go do whatever it takes to get all the tiles on that vehicle and put it on right and get it to launch on time. That is your job."

I said, "What do I have to do?"

He says, "Whatever you have to do. Change the procedure, change the philosophy, change the quality, change the engineering, cut deals with JSC, Marshall, on the TPS [Thermal Protection System] there, with whatever you have to do, you go do it and you report to me."

"Okay." So I became a continuing troubleshooter for the agency, in whatever they needed. You see a lot of little pieces of tile here, there, and everywhere. When I got done there, the tile guys gave me a little tile with my name on it and said, "This is for you."

We worked on that airplane, we worked on that tile. Christmas Eve, we were out there putting tile on. We went to the pad, we researched it, we finally got everything in place and we launched and everything almost worked. But as soon as they opened the door, they saw a tile fly off the top of the OMS [Orbital Maneuvering System] pod, one of the white tiles.

So we considered new ways of doing business for the whole shuttle fleet. We hired several hundred people for three months, and we kept them for two years. We took housewives, we took barmaids, we took college students, we took all kinds of folks and we developed some skills on doing ceramic tile. We took the tiles and we found out that they were not strong enough. The facing on it was not dense enough, so consequently, when you put glue and you put it on aluminum skin, and then you pull on it, it pulls right off, or the skin pulls right off.

So we had to figure out a way to densify them. So we put solution on both sides so that they would stick to the ship and solution such that the coating would stick to it, so we took a process from Sunnyvale and we improved on it. Minnesota mud. It was the 3M Company that made it. So when they said to me, "Well, Reyes, how are we going to do it? What are you going to do to this tile? What have you done about those tiles to prevent all this?"

I said, "Well, did what Moses and the other guys had to do."

"Well, what the hell did you do?"

"We added more straw."

"You what?"

"We added more straw."

He said, "What do you mean?"

I said, "They were not dense enough, so we needed to densify the layers of the foam, so that it would take the adhesive on both sides, then we put in the gap fillers and the rest is history."

He says, "And why did it take so long?"

I said, "Because we had to have the ladies coat it this way, and then as it absorbs it, then you turn it the other way and go like this, so it takes time to lay all those coatings, and then you see the material, and you see the tile, soak in."

What time's your next appointment?

BUTLER: My next appointment is actually my flight out, at five-twenty, from Orlando Airport.

REYES: Okay, you've got time. Don't worry, we'll feed you, okay?

BUTLER: Not a problem. It's very interesting.

REYES: You see how strong that is? [Displays an example of the shuttle tile.]

BUTLER: Yes.

REYES: That's densified. I don't have a real one here to show you. They come in different odd shapes and everything else. But what happened is, some of this that was not densified came off, so then you densified and then you added RTV and you added some felt, and then you glued it in place. That's very nice of them to do for me.

BUTLER: That is very nice.

REYES: First of all, they put a scrap on it, then they put my name on it. I said, "Will you take the scrap off, guys? Jesus Christ, what am I, a scrappy kind of a guy?" So I have the—the last that we put on was toward the front of the door, and this was a splash. This was made with a, like a plaster of Paris, and then we pulled it out. So in the front door, when you see them close the front door, this is how thick some of those things are. And in here, we have gap fillers that prevent the heat from going, and then when you build your airplane, you build it such that all of the gaps do not fly against the wind. Otherwise, it's like a blowtorch and it cuts it in pieces.

And you see this model that I have right here? I built that model and we used to take it out there, and we would sit and we would look and we would decide what array needs what, because the first models that came out showed all the tile numbers and all the tile array.

BUTLER: Oh, yes.

REYES: See how all the tile goes? See how all the tile goes? And what you want is, you don't want air coming in and digging out all the stuff that goes in between them. So that's why the tile was at an angle. These were fiberglass, right here. Carbon, carbon glass, and the rest of this was tile. These are the ones I was showing you in here.

So I took that at work, and at work, we would use this model to show what was needed here, and what was needed there and everywhere else. So anyway, we finished the orbiter, we finished, and we got operational. The tile czar days are over, I went back to being a designer to work on the OPF [Orbiter Processing Facility], and hell, we were going to have three processes there.

Then I got into the commercial satellite business and started working with them. We launched a mission and we lost two satellites. The nozzles blew out, so I was the one and only NASA assigned to the failure investigation board. The nozzles were built and then the numbers were put on them and then they were flown and everything worked. The old man that worked on the nozzles left, and they hired a new man, and the new man put the part number and the paint and everything else on the thin phenolic nozzle. When the nozzle lit off into space, that place where the numbers were and everything else got hot and it exploded, and the nozzle itself blew off, and the satellite was dead in space.

So we had two huge satellites floating into space and that became one of the NASA missions, to go up there and rescue those two satellites. But it happened because the old man had done the job, he left, the new man came in and he put the name and number in the wrong location, and consequently, you were had, you were left the thing going on and exploding, getting red hot and exploding. Worked on that job. We had the shuttle fatality. We had a

couple fatalities before. Everybody knows about [Sharon] Crista McAuliffe and everything else. Did you know about the other deaths that we had out there on the pad?

BUTLER: No.

REYES: A lot of people don't. We were running a test. The test conductor's running the test. The way we run a test, we have three or four people run the test. These guys—we had six guys in the aft. The aft is three stories inside and they decided they were going to purge with nitrogen. Well, some people didn't hear and some of the people were on different channels doing something else, and before we knew it, we had people in an area where they shouldn't have been. So pretty soon, they get overcome by nitrogen and they pass out. So it happened and a couple guys went in there to remove some of the guys, and they all had their Apollo era suits with hooks so you could pull them out and everything else. Nothing happened. They fainted, they passed out. So a fire truck comes out, we have a fiasco with the fire trucks, and security not letting them in and this good stuff and everything.

The bottom line is, we lost some people there. They got asphyxiated. Some we pulled out and were able to revive, others we weren't. Because we were testing two dangerous systems in parallel, and we had these people in a closed environment. We should have never had them in a closed environment, blowing all that nitrogen, because it would cause you to pass out and then you die. So that was the first case of a tragedy on the shuttle, in the shuttle processing on the ground, and it was all technicians who were lost and dead.

The next shuttle accident was obviously the problem with the temperature in the O-ring seals that everybody knows the story of, and that thing blew up. That was the only flight

I ever saw from the outside. I was always inside, and they said, "Ernie, it's too cold up there. Here's a badge, 51-L. Go out there and look at it." And here I am, looking at it with five or six, or eight, ten guys out there, and it's cold as hell and there it is and they're counting down. And I guess from here to the kitchen door is where the crew families are. Jiminy Christmas, the thing takes off. Okay for throttle up, there's my patch, there's my crew, there's Dick Scoby, there's Allison, there's—oh my God, boom. And I said, "Oh, my God. That's it." And all the guys are saying, "RTLTF, RTLTF, RTLTF!" Return to launch facility. In other words, come on out of the cloud and bring that airplane down here.

When it blew up, you've seen all the pictures, the wind—well, the wind hit it and then it—little shears. But as long as I'll live, I had a very close relationship with the crews, very close, too close. But the kids and the wives, screaming. And you're right here, and you're screaming right there and you see the pieces. It's bad enough to see the stuff, but to hear the wives. So I said, "Okay, I'm going to do what I did during Apollo."

After the Apollo fire, I was in charge of training the crews for egress, and making damn sure that they all got out, they all—making damn sure they all knew how to get in and get out...[of their capsule]. Well, after the *Challenger*, we formed a bunch of teams to review procedures and to review this and to review that, and we had some excellent people. We have excellent people in the agency, okay. I don't care whether they're Southern or Midwestern or whoever, whether in Houston or here or anything. They're damn good people. Men, women, whatever. They're all good people.

And we had teams, to review paper, to review this, to discuss this, to think of ways of improving the various operations. And I have a habit of not being very quiet. John Young and myself, we don't know when to shut up. So I kept talking and I kept edging and I kept

pointing with a pointed stick, and when it was all said and done, I don't think any one of us can say that I'm responsible for this or I'm responsible for that. But after all that's said and done, Tom Ottzman, one of the senior guys in the agency, came to me and said, "Ernie..." He was the guy with the sewing machines. He said, "Ernie, NASA needs some different brand of leaders around this place and other places, so the first SES [Senior Executive Service] that comes along, you're it, you're at Kennedy, you're the next one."

Sure enough, the job of quality was created, or came open, or whatever, and I became the director of Quality Assurance for the Kennedy Space Center. That means all contractors, all contracts that we have with the external world. That means all across the U.S. of A. and Europe, all our suppliers, to make sure that things are built right, make sure they're in cahoots with the FAR. You know what a FAR is? F-A-R?

BUTLER: I know I've heard the term, but—

REYES: Federal Acquisition Requirements. You spend a dollar of your taxpayers' money, you make damn sure that the taxpayers get their money's worth. So the FAR requirements extend to all suppliers of goods and services for the government. So I did work for ten years, eleven years with the quality. I started out and we went up almost 350 people, inspectors and whatever. That's a lot of people. Now that's not as many as we had managing the tile. I think I had something like four, five, six, seven hundred people working tile, on a daily basis.

But when you look at Apollo, we had 400 to 700 people, technicians, changing badges in the O&C every day. Now I wasn't directly responsible for all of them. I had a certain job. But on the tile, I was responsible for that, and that was a lot of people. That was

a lot of responsibility there, but I enjoyed it. I just took it in stride. I just don't worry about it.

Same thing happened with the quality. They wanted this, they wanted that. I said, "Just tell me what you want. Crip [Robert L. Crippen], you tell me, and I'll go do it." ...Then one day he showed up and he and John Young are going to fly the first Columbia. And he says, "Hey, trouble, how are you?" He used to call me "trouble." And I said, "Very good. Leave it to my old buddies to show up at the wrong time."

They showed up the day that we were passing out pink slips to all the people that we were going to let go. We had worked the folks, hired them for six months and kept them for almost three years, and that was the day that we were letting them go. So they said, "Oh my God, we're here to give a motivation talk, and oh my God, oh my God." I said, "Let me tell you guys. This is what's happening today. Best thing you can do is just get up there on the back of this trailer or on the front, or wherever you have to stand. Make sure they can see you, thank them for the good jobs they've done, and thank them for continuing to support the program, and then you go out there and shake their hands and autograph their shirts or paychecks or pink slips or whatever the hell you want to."

They did better than that. They made it a real positive thing, and sure enough, they wound up signing shirts and people went out with a pink slip and a smile on their face, and everybody had their box cameras and their brownies and whatever, and the rest is history.

John Young and Crippen came back. They almost had to come back before, because the toilet backflushed and fired up and wouldn't work right. But they came back and they did good. And after that, both continued with good careers. John got in trouble because he always spoke out at the wrong time about the wrong topic and Crippen became the center

director out here at this center, and we used to reminisce, but he'd forgotten about California...

To the day he left, he said, "Okay, Ernie, what trouble have you got me into now? Now, I know you're up to no good. You've got trouble." I said, "No, I'm not causing trouble. I just think we need to do this, or I think we need to do that." He is now president of Morton-Thiokol in Utah, Ogden, Utah, working on solid rocket motors.

But here again, I didn't finish that story with...[Crip] I thought I'd tell you. I'd said, "Remember when we used to drink beer in L.A.?" "I don't remember that, Ernie." Peace. Peace, brother. It's tough not to remember stories. But it's been a long and illustrious career. The guys called me in Seattle. I went to work, like what I had worked in Apollo, and I wound up writing the program plan, the quality plan, the safety plan, the logistics plan, for the Kistler [Aerospace] Corporation. They're a commercial outfit. They're trying to build two-stage rockets to fly out of Australia and then out of Nevada. I'm supposed to call them back, because if they're there, they wanted me to take care of one of the assembly, one of the major segments in New Orleans, in Michaud. And we're supposed to fly the first part of 1999, or some time there.

So that's what I've been taking money, that's my little laptop, so I do everything on that. I don't have a computer station. I use a laptop and I use the softies. Spent time last year as a consultant on *From the Earth to the Moon*. Tom Hanks got all fired up with Apollo 13, and he wanted to go and build a series and get all these different directors and do the thing, so he got the money and they went at MGM studios and they built a script and they put together stories.

Unfortunately, all the stories that everybody has, including all the stories we're going to get here, out of all your interviews, the agency, the press, whatever, they always have a tendency to want to center around the astronauts or their wives. And when we talked, he said, "Oh, no, no, no, Ernie. We're going to concentrate on the people and the people that made it a success and the people that made it go."

But talking to him and reading the script, I said, "This is wrong." I went and talked to Dave Scott. Dave Scott of Apollo 9 and Apollo 15. I said, "They got Skip Chauvin in the blockhouse. He was never there. Spacecraft checkout was done at the O&C." "Ernie, I've been working that for a year and they won't change their mind." I said, "Hey, peace, brother. You're the tech advisor. I'm just a helper, but if they don't want to change it, so be it."

They had names, they had places mixed up. They had everybody doing everything at the blockhouse, which is wrong. We did all the command service modules and the lunar modules and all that checking out from the O&C. We received them, we tested them, we committed to launch from there to the pad. At the launch time the pad was ready, there was a "spacecraft ready" light that I would hit the buttons. The spacecraft light went on. Skip would talk to the crew. Fritz would talk to some of the crew. The guys would talk to him.

The very first launch, John Glenn took off, and Tom O'Malley—Tom O'Malley, he's quite a character. He said—he's Irish—he said, "May the wee people be with you, John." Took off. Well, Skip did something on one of the missions. I forget, the early Apollo missions. He said, "Gentlemen, Godspeed and good luck," or something to the effect. "On the part of the KSC team, we wish you good luck and Godspeed." Well, we can't have the test conductor doing that. We better let the launch director do that, or we better let Houston do that or we better—I mean, we'd been working with these guys all this time, but they better

not—they better let them say that. So one of the little things that we used to say that we don't say anymore.

The story of Apollo on TV became wives and it became astronauts and it became a soapy. And it didn't delve, it didn't touch on George or Tom or George Scurla [phonetic]. It touched on a few things, but there were a lot of men and a lot of women and a lot of contractors that did a lot of work, that gave their lives to this company, to this effort. As I'm talking to you, I'm still running through so many stories of good things that were done by good people, that nobody will ever know, because nobody will ever write them down.

BUTLER: Well, we'd love to hear them. I'd love to come back and hear some more stories.

REYES: There's just so many different things that you just got to pick a thing to say, "Okay, we'll talk about, not necessarily this." This was history that got worked, and it got done, and I was sitting there talking to the director. [Looking at photographs.] That's Mr. Tom Hanks and that's Guenter Wendt. That's Mr. [Mark] Harmon, [*Chicago*] *Hope*, TV show. I've got a whole stack of pictures that we took of the various guys and gals, but we're sitting there and they said, "We're getting all our suits all blackened by going in and out." That's Tom Hanks. That's Dave Scott now. He looks a little older, a little pudgy. Yours truly. I got directed to be suit tech because they got tired of the people not doing anything right, so they put me in and they put me in the right get-up to be an actor when the movie was done.

BUTLER: All right. I'll have to go back and watch it again and look for you.

REYES: Look through the credits. But he said, "We're getting these suits all dirty, this ain't working, this and that, etc., etc." I said, "Black tape." He says, "What?" I said, "That black vinyl tape the guys got up there. If you'll put that on the crew hats and the seal, then you can slide in and out all day, you won't get any marks." "Harry, get that done." Instantly this black tape and they run in and out, and everything's okay.

And then my job was to show them how to get the astronauts in and how to get them out and how to hook them up and how to have them throw the right switches and all that good stuff. And after that little episode, the director and the assistant director say, "Okay, Ernie, you stand right here with me, all day. I want you right here. And if there's something, you tell me what we did." So after a while, I said, "Okay, this is the correct thing, but you can do the correct thing or you can do this, or you can do that. Whatever your budget or whatever will come out in the view of the camera or whatever."

But it was funny because they said, "Well, who's going to notice that the crew and the capsules are not checked out in the O&C?" I said, "Hey, about a thousand people that worked on the capsules in the building, plus obviously, all the Houston people that interfaced with Skip and the guys in the firing room." They didn't—there was nobody in that blockhouse. [Donald K. "Deke"] Slayton was there and some of the other guys, but most of the guys were up talking in the other room.

So there are just stories after stories after stories that you start on one and you say, "Well, that almost happened, this almost didn't happen." I'll tell you one more and then I'll shut up and then you tell me what we need to do from—there's a guy named Elmer—and I'm going to tell you, I'll think of his second name here shortly. He was a pyrotechnic engineer, and we got ready to do Gemini capsules and then we had a problem.

The supplier of all the little ordnance pyrotechnics, the supplier, SOS, was in Pasadena, was debunk. The company president was playing too much golf. The engineering had gone to hell, the production wasn't there. We had too many [pyrotechnic] cartridges that we needed built for a variety of things, from cutting guillotines to cutting wires and cutting off water or fluids, to ejecting parachutes or whatever.

And they said, "Well, what are we going to do?" Diesel, Elmer Diesel. I said, "Well, we can go and we can build the cartridges ourselves. We only need twelve cartridges for these next two vehicles, and by that time, we can get a second vendor." So we found out that the Department of Defense depended on Honest John and this and that, and missile systems for these cartridges. And so we get to the place, and we go up to the front door and we say, "We're looking for so and so." "Well, he's not here." "Well, where is he?" "Well, he's not here." "Well, let's talk to the second in command." "Well, he's not here." "Well, let's talk to the chief engineer." "Well, he's here. He's back in the back room there somewhere."

So we said, "Hey, this is Elmer Diesel. He's with McDonnell Company and I'm Ernie Reyes, I'm with NASA, and we've come down here. We're trying to see what you have of these part numbers that we need for our launch coming up next month."

He says, "Well, I tell you. I've got a hell of a mess. My company president is either drunk, chasing a woman or playing golf somewhere. He inherited the company. He has let it turn to poochies, and I've got a guy and myself and this is our production facility." You see my garage? Their place wasn't that neat. I mean, it was a front office, and after that, you stepped in the back and there were dirt floors and there were some scales and there was some chemistry in jars and stuff. And then there were some vices and there were stainless steel cartridge bodies and stuff. And we said, "Holy Chihuahuas."

So Elmer said, "Ernie, let me make a couple phone calls and then I'll come back and then we'll figure out a plan." I said, "Okay. In the meantime, I'll see what I can scrounge around here. If you don't mind helping us." He says, "No, I'm here to help you guys. I want to help you guys." I said, "Terrific. These are the parts that I need, and we've got to make so many, so we can lot qualify so many and have so many spares for flight and the flight articles." So he says, "No sweat."

So we went in. I found all the cartridges, I found the stainless steel wafers, and I found all the chemistry and I made sure all the chemistry was dated on the things. So then I went to—Elmer showed up and I said, "Okay, what did you do?" He says, "I got us accommodations." I said, "Where?" He says, "At the White House." I said, "Is that a nice place to stay?" He says, "You'll love it, Ernie. Don't worry. Let's go to work." I said, "Okay."

...Elmer Diesel. We went and we got the cartridges and then we sat down to figuring out formulas on, we need so much gas expansion to provide the power to light the next cartridge, or to drive a guillotine or drive a chute. So we had to worry about chemical equations, moles of gas volume, the whole thing. Things that you do on paper in a college lab. And we're sitting there, and we're doing gram scales and we're trying to put a roof over our head, and then we got all the cartridges. I got the stacks and we started measuring and then we measured a bunch and then we fired a bunch just for gas measurements to see if we have enough volume and everything else. And then we took another one. We got a water hose and a piece of stainless pipe and some wires and we put the guillotine assembly, with a sharp blade, and we put so much gas and we made all our notations. We fired it. Boom! It

cut the copper wires, it cut this, it cut that, but it didn't quite seal the stainless steel tube or cut it. So obviously, you needed more gas. So there had to be some empirical type data taken.

So there we were, doing engineering, chemical engineering, with chemicals. So we measured, we did this, we did that. Finally, we got enough and finally it was working perfect. So then we built fifty and we tested twenty and we had enough for two launches. And we random picked the serial—we serial numbered and we anodized the number on each side of these little rascals, part numbered them, packaged them and then every other one we tested to lot qualify they all would work. We did the same thing with the initiator, the cartridges, the pressure cartridges for the parachute bags and the whole thing.

We got what we needed, we boxed it, we put it in wooden box. We put all the right stencils and all the right shipping and the company was very helpful. They got shippers for us. We went and we put stuff on trucks and we shipped it to the Cape, and then the rest of the items we kept with us and we finished it, and then when we finished the job, we thanked the guy, we kept copies of all the equations and all the data that we had had, in case somebody was going to ask, and then we let him have a copy.

We leave the door and he calls us at the White House before we checked out, and he said, "Well, guys, I'm sorry to say it, but you guys did the right thing, in NASA anyway." The Department of Defense went in there and impounded it and locked up everything.

BUTLER: Oh my.

REYES: Because they needed cartridges for the thing. And then their representatives came to us and asked us if we could do the same for their programs, military programs. And we said,

"Hey, man, we're just down here on a search and rescue mission." Talk about one ranger, one disturbance.

The White House was a dilapidated, abandoned, two-story, white-shingled, white house, in Pasadena, in the hills. It had been abandoned. He called, and they couldn't rent us a house anywhere, so he talked to a realtor, had the realtor find this place that had running water, clean bed and sheets and everything else, and a kitchen. They put in a refrigerator, they stocked it with food, and we lived in this white house that was—it looks like something out of Disney, the haunted castle place.

And we lived in that place, we drove a car, we had one car. It was tight. I didn't need a car. If I could ride with Elmer, I rode with him, and we created the cartridges, we wrote our reports, we made our phone calls, but we lived and showered and shaved in that place. We went to the washateria once in the two weeks that we were there. But when we came home, we came home with a product that was...[flight qualified].

Elmer went and retired from the company, then he worked as a safety engineer for KSC for many years before he died of cancer. He had two boys. One became Jack. Jack is a cheerleader for the local football team, and he is a logistics guy for McDonnell-Douglas. He's a huge guy, six foot at least. His dad was six foot, but as skinny as a rail. Ichabod Crane, I called him. I've known him since he was a little boy, that was his son. The other son was a rambunctious little guy and he's a horse now. He's the head football coach for the [local Titusville High School]—and his wife is still in a school system as an administrator.

Who's going to...[talk] about Elmer? [Who will ever know that Elmer was a brilliant engineer, a descent man, and largely responsible for the success of the early Gemini capsules?] Gemini II went. Gemini III, Gemini IV, and I can tell you every astronaut that

flew in them. But we talked for Elmer. There's a lot of Elmers [that worked on the NASA programs].

How about some soup? Sandwich? I got all kinds of fixings.

[End of Interview]