

NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT

EDITED ORAL HISTORY TRANSCRIPT

EDWARD M. MAUTNER
INTERVIEWED BY JENNIFER ROSS-NAZZAL
CHANTILLY, VIRGINIA – 22 MARCH 2012

ROSS-NAZZAL: Today is March 22, 2012. This interview with Ed Mautner is being conducted at the [Smithsonian National Air and Space Museum] Steven Udvar-Hazy Center in Chantilly, Virginia, for the JSC Oral History Project. Interviewer is Jennifer Ross-Nazzal, assisted by Rebecca Wright. Thanks again for taking time out of your schedule.

MAUTNER: You're welcome, it's my pleasure to do it.

ROSS-NAZZAL: If you would, tell us about the state of [OV (orbiter vehicle)-101] Enterprise in 2003 before she was restored.

MAUTNER: My familiarity with *Enterprise* was quite limited before I began work on it. When we received it, it had been stored both outdoors and in a non-climate-controlled hangar since the mid-80s, and a lot of deterioration of the surface coatings—the paint, the markings—had taken place. Woodpeckers had gotten up onto the vertical stabilizer and pecked a lot of holes into the polyurethane foam that they used as a mockup for tiles. I don't recall the number of holes, but there were quite a few of them.

And then just about every form of creature had made the *Enterprise* their habitat and playground. Birds had gotten into it; bugs had gotten into it. Hornets or wasps had made their little mud nests in the landing gear wells. They made it out of this beautiful red Virginia clay dirt

that surrounds the area. In fact, when we started to clean them it almost seemed as if the aircraft was bleeding, the soil they made those nests out of was so red.

It had basically suffered a lot of inattention. It hadn't been cleaned or worked on to any great degree. I believe it was outside for about two years prior to them building the hangar for it, and it had been rained on. There were many ports of entries for water, and so water had pooled inside the bottom of the fuselage and it had left a lot of staining from dirt, waterlines, etc. and also had caused some minor pitting and corrosion. Nothing that would weaken the structure of the aircraft but certainly had caused some deterioration.

ROSS-NAZZAL: Tell us about that move, when you decided to move her from that hangar into this facility.

MAUTNER: Until I walked in March 1st of 2004, I had never touched *Enterprise* and I had really nothing to do with it. I recall being in the hangar the day they moved it in, and just about all the employees who were out here took a break to watch them tug it down the tow way from the airport and into the building.

What was noteworthy at the time was that they had cut a notch in the back wall of the space hangar in order to permit the vertical [stabilizer] to come through. It was the only way to get *Enterprise* into that building without taking the vertical off, which would have been a prohibitively difficult task. I came back the next day and the blanking plate had been restored as if the building had never changed at all, so that was pretty neat. It was a well-prepared move.

That took place in the early fall of 2003, and while I was aware that it was in the building, it was sometime after January 2004 that I was notified that I would be working on it in preparation for the opening of the space hall [James S. McDonnell Space Hangar].

ROSS-NAZZAL: What was your expertise prior to working on *Enterprise*? Were you working on aircraft restoration?

MAUTNER: My background is—the British would describe it as checkered. I did a whole lot of things before I got directly involved in airplanes. I started out as a kid building model airplanes, and I never gave that up. I always built model airplanes, and I continue to do so. And I was always a museum rat, an airplane museum rat. Whenever we traveled, wherever we went, there was always a stop at an airplane museum somewhere.

Somewhere around the late 80s, my wife and I had moved our children to southern California, and I began to volunteer in some aircraft museums out there. Planes of Fame in [Air Museum] Chino, and later at the Command Museum at U.S. Marine Corps Air Station El Toro, which was right in the town I lived in so it was convenient to work there. I started doing structures work.

In January of 1989 I left a former career and made a great midlife career change whereby I wanted to work in an aircraft museum. I had enjoyed volunteering on Saturdays so much, I went to Cal [California] State University, San Bernardino, for a Museum Studies certificate program. My background was in auto mechanics, and I needed to create a resume to get into working on aircraft, especially in museums. I enjoyed it immensely but had a problem with the hours of class.

By great good fortune, McDonnell Douglas [Corporation] was hiring mechanics in the summer of 1989. Actually they'd been hiring prior to that, but that's when I found out. I went and I applied, and they hired me immediately because of my automotive experience. I became a structures mechanic on the C-17 [aircraft] program in Long Beach, California. That was my first real hands-on experience with real aircraft manufacturing.

I worked at McDonnell Douglas from August of 1989 until June of 1994, when there were massive layoffs. They were losing their contracts for MD-80s [airliners], and the MD-11 [airliner] never took off. The C-17 was in a state of flux because Congress and the Air Force were at loggerheads, so I and tens of thousands of others were laid off during that year.

Meanwhile I had gone from my certificate program at Cal State, San Bernardino, to a Master's program at Cal State, Dominguez Hills in Historic Preservation. Because John [F.] McDonnell of the McDonnell Douglas Corporation was interested in an educated workforce, they paid for almost all of my Master's program, everything but my research courses and my thesis.

I had early on decided that my thesis was going to be in aircraft preservation at the National Air and Space Museum. I thought that they were the best. They were the ones that were writing about aircraft preservation, and I really wanted to write about how they did it, because that seemed to be the benchmark.

In June of 1994 I was laid off, and I immediately contacted the museum to do an internship back here so that I could do further research for my thesis. In August and September of '94 I did a 60-day volunteer internship. I was outside of their regular program, so there was no stipend; I just came in and volunteered. I worked in the restoration shop during the day until

about 3:30 [p.m.]. I'd then go across the river, downtown to the main museum and I would work in the archives.

The people in the archives—I don't know why, I was a total stranger to them—they let me stay after hours. In fact, at five o'clock when they left, they issued me instructions on what lights to turn off and how to shut down the computers. I would stay there till 8:30 so I'd get all my research. I had one other paper and I had my thesis to do, so I spent almost every weekday night at the museum doing that.

They said, "Stay in touch; we're going to be hiring." The hiring was going to ramp up for this facility, this new Udvar-Hazy Center, so I stayed in touch. Every month I contacted somebody associated with the restoration facility, and finally in 1997 they said, "Something's going to happen. Get back here; be nearby." So I stayed with relatives and I hung out and I volunteered, and finally in February of 1998 they hired me. They did it because I had the academic background, but I also had, from McDonnell Douglas and my volunteer efforts, the mechanical background as well. I was very fortunate that the timing worked out.

My background is chiefly in aircraft structures, which would be the main metal pieces that form the basis of the aircraft upon which everything else is hung. After I get through with my work, then the hydraulics people and the fuel people and the electrical people and the power plant people take over.

ROSS-NAZZAL: What sort of planes have you worked on since you began working here?

MAUTNER: The first one that I started working on was a Japanese single-engine floatplane bomber, [the Aichi M6A1 Seiran]. It looks more like a fighter with floats, but it was in fact a

strategic bomber that the Japanese designed to fold up into an 11-foot diameter circle and fit into the tube on a submarine. This submarine was an aircraft carrier, literally, and it carried three of these. Very significant aircraft, because it was designed to bomb the Panama Canal locks.

The submarine was probably more technologically advanced than the aircraft. It was designed to go 27,000 miles without refueling, and they actually did have plans to use these small bombers to bomb New York [City, New York] and possibly even Boston [Massachusetts]. It was a metal airplane, and my sheet metal experience came to good use there.

After that, they put me on a World War I bomber, a twin-engine fabric-and-wood bomber. That airplane was a Caudron G.4, a French bomber that the United States tested but never purchased. Because we had no combat aircraft in World War I, we had to go to the French and the British and the Italians. That was an excellent experience because that broadened out my sheet metal and structures experience to wood and fabric. That airplane is also currently on display here.

The next aircraft is one I'm still working on. We have a limited number of people here, so we get shifted off of whatever project we're on to take care of other things in the museum, such as creating a display or working on the *Enterprise* for nine months in 2004. From about 2000 until this year, I'm still working on a World War II German night fighter, the Heinkel 219, a huge metal twin-engine aircraft, where again my airframe and sheet metal experience has come into use.

ROSS-NAZZAL: Tell us what lessons you learned from working on those aircraft that you applied to the *Enterprise*.

MAUTNER: In my case, precious few. It was a great departure from what we call restoration, where you actually have to fabricate or replicate or repair structural pieces of an aircraft. This was largely a massive clean-up and painting effort, so it falls under the role of preservation. That's really our role here, preservation. Everybody talks about restoration, but restoration is the court of last resort when everything has pretty much gone to pot and needs to be drastically repaired or replaced.

What we did on *Enterprise* fell under the heading of preservation, but we called it a refurbishment because we didn't do anything to repair it. It was still considered to be NASA's aircraft, and it came to us in such good structural condition that there really was nothing to repair on it except for the paint work.

ROSS-NAZZAL: Would you tell us about working with NASA and USA [United Space Alliance] on this project? I understand they were involved.

MAUTNER: Yes, they were. When we first began on March 1, 2004, we were pretty much on our own. There were just three of us: myself, Anne [C.] McCombs, and Steve Kautner. We walked into this big empty hangar. The only thing that was in it at the time was *Enterprise*, and it didn't even have a barrier around it because the public wasn't allowed in that building yet. We just kind of stood there and wondered, "Where the heck are we going to start on this thing?"

We had no high-lift equipment—all we had access to were ladders—so we decided to start working on the landing gear. We had no contact with NASA outside of certain parameters that they gave us in cleaning and painting it, that we were given by the curator, Valerie Neal.

Without anything else but ourselves, we began the cleaning process at the lowest part of the Space Shuttle, areas that were accessible initially to us.

Our experience with NASA and USA came a little bit later, and [their] big project was the removal of all of the cockpit windscreens, the front ones. I believe that there were three panels in them, and there were some engineering discussions as to whether they could get away with just two panels. The challenge for us was to provide them with the platforms to get up there and work off of.

Anne and I were involved, and at that point we had a lot of mechanics from United Airlines [Inc.] come in to assist us. Their bosses permitted them to give us some high-lift platforms that were attached to trucks. We could maneuver a truck in and then raise a platform and extend it out over the nose of *Enterprise* in order for the USA guys to remove those windshields. The other problem was these windscreens were very, very heavy. They required quite a bit of effort to crane off of the Shuttle.

At that point, I began to get to meet some of the guys, most specifically from USA. One of them was a fellow named Tom [Thomas W.] Roberts, and Tom's my friend now. He was back here for the last visit. There were several other mechanics that came up from KSC [NASA Kennedy Space Center, Florida] who I would count as really good acquaintances, friends, who we worked with. Got to meet Kevin [C.] Templin. He was always there, very personable fellow, and always a go-to guy for information and leadership.

Whenever they came back, we dropped what we were doing and became assistants to them, to the point where in this last visit we were almost considered more one of their group than as a separate entity, which was kind of neat. The things I saw from everybody in NASA and

USA was enthusiasm, expertise, positive attitude, and great great teamwork. The first thing we noticed is how well they worked as a team.

Many times we didn't know that these guys had never worked together before, and yet it was a seamless effort. You got to talking to them, you got to know them, and you realized, this guy never worked on the back end of the aircraft. He always worked on the front and didn't even know the guys that they were working with. That was inspiring to us to see that kind of effort that they used to put in.

Some of my recollection of my efforts with NASA and USA get a little bit confused, because some of their efforts were during that nine-month period when we worked on preparing *Enterprise* for the opening of the space hangar, but several of them came later. They would ask Anne or myself or others from the previous team to come back and assist them. I believe that the windshield effort was made during that nine months we were there, but our other efforts with them came later, so they'd be outside the parameters of my work on the *Enterprise*.

ROSS-NAZZAL: I also read that you had to replace the OMS [orbital maneuvering system] pods because they had rotted.

MAUTNER: Yes, we did. One of the first things we did was to remove those. Tony [Anthony W.] Carp was the team lead for the lifting of the OMS pods. They were a large aluminum plate that mated up to the surface of the Shuttle, but everything above that aluminum plate was basically wood. Plywood flooring, then 2 x 4 and 4 x 4 framework, and then they put a fiberglass cover over the top of that.

We discovered how weak the structure was when we started to tighten up the fittings for the lifting rings. We'd gotten a guy inside to tighten the nuts up inside because they seemed loose, and he kept tightening and tightening and tightening. We suddenly realized that wood was so soft from moisture that he was just tightening the nut and the washer right into the wood. We had to be very, very careful lifting those OMS pods off.

The OMS pods were never planned to be on the Shuttle when the space hall opened. That was something that we were going to install later, so our job now was to focus just on the Shuttle, and guys back in the shop worked on the OMS pods.

ROSS-NAZZAL: Are they on there now, have they been replaced?

MAUTNER: They were put on I think in 2005, 2006 time range, and before the last visit to get *Enterprise* ready we removed them. They're out in the shop, on the floor. The guys from USA put the ALTA [Approach and Landing Test Article] pods on. Those are the travel pods. They look like OMS pods, but they're real metal. They're real structural, flightworthy, and the tail cone fits up to those components.

ROSS-NAZZAL: Tell us about cleaning and painting the vehicle. That sounded like a very large chore.

MAUTNER: Yes, it really was. I started on March 1st to clean the right main landing gear bay and ultimately the landing gear and tires. Steve Kautner took the left bay and did the same, and Anne McCombs worked on the nose gear and the nose gear bay. It wasn't until March 22nd that

Tony [Carp] came on the team, and his job was to clean the entire vertical surface with the ultimate purpose of coring or filling the holes that the woodpeckers had made.

Somebody might at this point ask, why would woodpeckers go after polyurethane foam? The explanation we got—I'm not an ornithologist—is that woodpeckers make the noise they do as a mating call, not just to get to bugs inside of the tree. Once they got through that polyurethane foam, they were banging on an aluminum surface. It made quite a noise, and it was far-reaching. There were about 75 holes ranging from very small, smaller than your pinky, to much bigger than your thumb.

We were using, on NASA's recommendation, Amway LOC [liquid organic cleaner] cut, one part LOC to ten parts water, to wash everything. It's a mild organic detergent, and it's biodegradable. This was what USA used, so this was what we used. And this is where, in the wheel wells, I found most of the hornet nests. Once you got the water into them they just started running down the beautiful epoxy white paint panels inside.

At that point, once Steve had finished his wheel well, he started working on the bottom. He started up at the nose where he could reach, because you couldn't get a ladder under there. He's all scrunched up, just scrubbing away—and he was a bear of a guy. He had a lot of strength, and he just kept working down the bottom of the aircraft, all of the black-painted area of the aircraft.

At that point we started using some lift equipment, JLG [Industries, Inc.] lifts and scissor lifts, to get up on the wing. We began cleaning the wing while Tony is cleaning the vertical, and we did this day after day after day. Then sometime in the summer, I believe in July, we began prepping the center fuselage for paint. The center fuselage does not have polyurethane foam on it, and that center fuselage extends from just behind the cockpit to back underneath the OMS

Pods. We also had to clean the payload bay doors. At this point we finally were able to get scaffolding in. We had a local company contracted to put scaffolding all up the sides and then bridge the top of the Shuttle.

This is where things kind of got interesting. Initially it was doing just a lot of sanding on the side. Apparently the aircraft had been painted with aerospace quality polyurethane or epoxy paint and primer, but when it went on tour in 1984 it had started to look a little bit secondhand. They used a latex house paint to give it a quick repaint to make it appear better at the [New Orleans, Louisiana] World's Fair here in the United States, and then they went to the Paris Air Show with it. This was all prior to delivering it to us.

This paint over the years had become very brittle and very hard and would be quite a challenge to remove. Taking it off the sides was pretty easy. We were able to use electric sanders or pneumatic sanding devices, hand-held devices, and literally sand all of that down to the original paint. The sanding gave the surface a real good surface for paint to adhere to once we finished it and cleaned it up, but the real challenge came with the payload bay doors. We were instructed by NASA to not use any metal tools, any caustic chemicals, or any abrasives to remove the paint.

We got up there, and they thought it would be really easy because a lot of the paint on the payload bay doors had flaked off, and some of it was literally sitting up. They said, "Just use duct tape and press it down real hard and pull it off, and that paint will pull up." Well, that didn't work at all.

All of our communications with them were through Valerie Neal, the curator. The other thing we weren't supposed to use was heat, so we went to Valerie and said, "The duct tape just isn't cutting it." They said, "Use plexiglas scrapers." Plexiglas is a real hard plastic. We would

cut up sections of it, rectangles of it, and then make a sharp edge at one end with a grinding wheel. That wasn't cutting it either.

One day I'm sitting on the scaffolding, trying to get this stuff off, and I see to my left this movement from about chest height over the curvature of the door. I look over, and it's Steve Kautner with a metal scraper and a heat gun. I'm going, "Steve, what are you doing?" He goes, "This is the only way it's coming off." I said, "Okay, stop. Let's talk about this."

We went back to our conservator, and I asked him, "Do you have a surface temperature gauge?" We went back and attached this temperature surface gauge to the area that we were putting the heat on, and we got some heat parameters. We were getting heat in the range of about 175 degrees [Fahrenheit] if we kept the heat gun moving, so we went back to NASA and they said, "Okay, you can do that, but no temperatures over 200," or 250.

All of a sudden this became easy, but we now found out very quickly why they didn't want heat up there. The doors are made of carbon graphite, or carbon-carbon. It's skinned with an almost aluminum-foil thickness coating of aluminum. It's not like sheet metal, it's more like a foil, and if you left the heat on there too much it would blister. We got a couple of thumb-sized blisters; we damaged the door. This concerned us, and we kept talking to each other. We'd just make sure we'd keep that heat gun moving and don't overheat one spot.

It became very evident very quickly why they didn't want heat up there. They had done the same thing at some time in the past, only their blisters were much bigger than ours. That told us a) it's been done this way before, and b) there's a repair for it. We did make a few more blisters, an inevitable result of what we were doing, but we knew that if they needed those doors, they could be made flightworthy.

Then, because there was still a lot of paint residue clinging to the surface, we got down and used acetone. We were all garbed up with double-canister air masks. There's terrific pictures of us all down on our hands and knees on the door, all tied off because we're high up on the top of the Shuttle, scrubbing with Scotch-Brite scrubbers and acetone to get the surface completely clean and ready for paint.

That was another thing they told us, "You can't stand on the doors." So we had these four bridges across, and we're all leaning off these bridges and working off of them. Again, Steve Kautner's the first one to step off right on the doors. There's no other way to get out there, there was no way. I said, "Okay, stop. Let's talk this over." We went down inside the Shuttle, and we looked up at the doors and we could see the latching system.

We knew that those doors in zero gravity could open without any support, but we knew that they had big supports on them when they opened them in the hangar down in KSC. We looked at those supports, and we looked at how the doors fit together. It's built like a bridge as long as they're closed and locked, so four, five, six of us all were out on our hands and knees on the doors, scrubbing away to get the last residue and make a really good surface for paint.

That brings up another aspect for me. I couldn't wait every single day to come in. I'm not a space guy, I'm an airplane guy. In truth, the Shuttle is probably more like an aircraft than a spacecraft, and that one [*Enterprise*] never did go into space so it really was just an aircraft. I never followed space, I never got excited about it, but I got excited by this project. I couldn't wait to get in every single day. Every day was interesting and exciting, and we were making progress—slow—but we were making progress.

When they put the scaffolding up in July, we now had to climb this scaffolding. We had our harnesses on and we had our tethers, but we couldn't tether off anywhere on the way up.

We're climbing 30, 35, almost 40 feet in the air every morning, every break time, every time you had to leave, and then when we got up there we would tie off and secure ourselves. But that little element of danger made it exciting, and we talked about that a lot too.

We had two injuries, but only one on *Enterprise*. One of our guys did abrade his hand, but working on something else while we were out there, nothing to do with the Shuttle. One injury, very minor, on the Shuttle. One of our members fell off the payload bay doors, but he was tethered and it stopped him, and all he did was bang up his knee. I think we lost him one day, but that was it. The fact that we talked almost every day about the safety issue, that he was tethered off—we didn't have more issues.

The other thing that made it interesting and fun is that we were on this huge, very obvious artifact in the middle of this totally empty hall, and the public could come in to the front of the hall—there's an overlook up above—and watch us. I think the element of being on stage made it exciting and interesting, too.

There were some stresses. We always seemed short of personnel. At one point I realized there were a whole bunch of guys working on the OMS pods, and I had to convince my management that the OMS pods aren't needed by October 19th, but the Shuttle is, so can I have more guys? And I got more guys.

Once we had sanded down the sides and had removed the paint from the doors, it was time for a final prep and primer and paint. We had four guys do that, and we had a couple of issues that we had to deal with. One, it had to be an aerospace quality paint. PPG, Pittsburgh Paint and Glass, has always supplied us with our paint system that we've used exclusively for 20 years back at the [Paul E.] Garber [Preservation, Restoration, and Storage Facility, Suitland, Maryland], our restoration shop. Dave Wilson got in touch with them, and they turned him over

to their aerospace division. They donated what amounted to about \$15,000 worth of white polyurethane aerospace paint and primer.

Our next challenge was we could not spray in the building because the building had an open port, and some of the ventilation systems functioned with the aircraft hangar. Also, the filters in the ventilation system would get clogged up with any paint residue and dust, so we had to either brush or roll it. Dave talked with the people from PPG, and they had an additive that allowed the paint to flow so that it would not appear to be rolled-out paint. It wouldn't be textured, it would be nice and smooth.

We got the paint on September 17th—keeping in mind that this hall is supposed to open on October 19th of 2004. They had to rest assured that all the fumes would have dissipated by 10 o'clock opening the next day, so we painted at night. It was Tony, Dave, myself, and a fellow by the name of Bob Weihrauch who did it. We would come in, and that hall was completely black except for the Klieg lights that we worked under. We rolled out the primer, and then we rolled out the white. [We rolled out two coats of primer and two coats of white.]

I love working here at night because there's no people here, the lighting is all dim, and it's like going into a great cathedral at night when nobody's around. It's just beautiful. It's quiet. You've got all these objects that you love, many of which you've worked on, and there's just a neat thing about working here at night. We had a really good time. We had a really good crew. I don't recollect ever having any arguments or disagreements or problems, we just really had a good time.

One outstanding recollection is this facility is used by organizations—police organizations, FBI [Federal Bureau of Investigation], the MWAA, Metropolitan Washington Airport Authority. They have their own SWAT [special weapons and tactics] team and security

forces. They do a lot of work in here at night, but we didn't know that. One night three of us are up on this scaffolding, and Dave Wilson is on a scissor lift bringing paint up to us, and all the sudden there's movement in the hangar.

Keep in mind that outside of this cone of light that we're in, everything's dark out there, but there's movement. We look down, and there's 20 or 30 guys in black helmets, black outfits carrying guns, and they're swarming like ants through our hangar. Well, I immediately was not concerned because none of them are looking at us or pointing the gun at us. We're in white bunny suits, paper coveralls, and the Klieg lights are on us. We're out there, very obvious.

One guy kind of moved up to Dave, and he goes, "Have you seen her?" And Dave goes, "Seen who?" He goes, "Have you seen her?" and then he had to move, because you're not supposed to look for hints. Apparently they were on an exercise, and one of their supervisors came in two hours ahead of time and hid herself somewhere in the museum, and they had to find her. Nobody told us; our security had not advised us that this was going to happen.

Another time, during the day, I was working on the Shuttle and nobody else was around. Security came up to me and said, "We have a congressman or a senator here with his daughter back from college, and he's got his office manager and his security detail. Would you come down and talk to them?" So I walk inside of this circle of Secret Service people, and they've got their radios and they all look very, very official, and I started to talk to them. I said, "What state do you represent, sir?" He goes, "Oh, one of your neighbors." Meanwhile, his handler, his office guy, did all the talking.

I went back that night and I looked all over the Internet for our neighboring senators and congressmen, and I did not find him—because you can get the photos of all of them. I went back to security the next day and I said, "What was that all about?" He says, "Oh, it's just a test." It

was Secret Service in a practice run, and these guys were just members of the Secret Service that were playing a role to make it seem realistic. There are a lot of activities that go on here that are very interesting. But again, I was not forewarned of that.

The other two events that were really interesting—Joe [H.] Engle, one of the test pilots for *Enterprise*, came back and spent a day with us. He is just a prince of a guy, just a super guy. We got to tour him around and show him what we were doing, and he was just the friendliest guy and was very very grateful to us restoring “his” bird back to its original condition. A couple weeks later, we all got an 8 x 10 of him standing by *Enterprise* out at Palmdale [California] back in ’77, ’78, with a beautiful handwritten note and one of the original patches from his missions. It was just neat, a neat thing.

The other very very interesting visitor to us was Colonel Pamela Ann Melroy. She’s a two mission pilot and one mission command pilot [commander]. She was also on the *Columbia* [STS-107 accident] investigation team, and she led the cockpit reconstruction area. My recollection, she was about five-foot-five, five-foot-six. I immediately made a connection, because she was a test pilot on the C-17 program. As I had worked on it, we had some things to talk about.

I got to tour her around, and the thing I recollect so well is that she made a comment when we were in the cockpit. The cockpit of *Enterprise* is for the most part empty. The dashboard is there, but there’s only about three instruments, and they’re all old analog instruments. The seats are not there. She looked at that dashboard and marveled at the fact that it was the first time she’d seen one in a long time that wasn’t bits and pieces, because she had been looking and reviewing and trying to reassemble pieces of *Columbia*’s instrument panel.

This diminutive colonel in the Air Force—always at the end the photographer comes in and takes a picture of us with the VIP [very important person]. Anne and I were there at that time, and we're all standing off to the side, a foot away or something. She says, "Hey, we've been together all day. Come here!" She pulled us in right next to her to take the picture. We also got an 8x10 from her, signed, with a thank you and mission patches. Those are two of my favorite treasures from that whole time there.

ROSS-NAZZAL: Nice recollections of that time period.

MAUTNER: Yes, it really was. We got it done. Everything seemed late—getting personnel, the scaffolding came late, the paint came late—but we got it done. We got it done on October 18th, and October 19th was the day the media and the museum VIPs and everybody showed up to see it. It was a moment of pride because it really looked good.

Tony and I stayed after October 19th. Tony had some more work up on the vertical to do, and the one area that we hadn't really addressed was the propulsion bay. I would work in the propulsion bay; he'd work up top. We did this at night because the gallery was open to the public, so we did a lot of night work from October until we went away on Christmas vacation.

Most of cleanup in the propulsion bay—there was some FOD [Foreign Object Debris], there was old hardware. It went back to when it was delivered to us. There were some sections of insulating aluminum, nuts, bolts, washers, things like that. A lot of water had been back there, and the floor panel structure was a huge, thick piece of aluminum that they had milled out to look almost like a waffle. The floor looked like a large waffle pattern, so there's all these thousands of little pockets that had held water, and I had to clean them.

We had some nights where we had events, and the events usually allowed people to roam into the space hangar, so I would take my knapsack and my coffee and my lunch, my snacks, up into the propulsion bay. Something you don't normally do around artifacts, but I didn't think I could come out because of the events they had going on. I'd stay up there for eight hours. Well, there'd be a potty break.

We finished before our Christmas break, and then both of us reported back to the Garber Facility the first week in January 2005. It was rewarding every day, but they also rewarded our team with the Museum's Peer Award. The [museum] gives two Peer Awards every year, and the *Enterprise* Preservation Team was awarded [one of them] for 2004. It was a great experience.

ROSS-NAZZAL: What are you working on now that *Enterprise* is getting ready to take a new journey in its history to go to the Intrepid [Sea, Air & Space Museum in New York City]? Are you working on that?

MAUTNER: I did work on it. I don't know what my role will be in April when they come back, but the whole month of February I was assigned out here, along with Anne and one or two other folks, to escort NASA, USA, and some folks from [the] Boeing [Company]. "Escort" has a kind of static sound to it. We were essentially here to open doors that they couldn't get into, including getting to the restrooms, and we were able to get them discounts in our shop and at McDonalds.

And then pretty soon it was, "Oh my gosh. We don't have this; do you have this tool?" So we're running for tools. Later, as our professional relationship evolved, we were forklifting equipment for them. They had forklifts, but we were able to help them with that. We had a JLG

man lift that we were able to take them and some of their equipment up to different places on the Shuttle, and also on the tail cone, which they assembled right out here in this shop. As to my role when they come back on the 19th, I have not been told what that is yet. I hope [I] do, I have some friends I'd like to hang out with again.

ROSS-NAZZAL: Are you preparing in any way to accept [OV-103] *Discovery*, or are you primarily working with the *Enterprise*?

MAUTNER: I'm not. My responsibility is to work on this German night fighter. We still have a wing to complete. The airframe fuselage is out in the museum right here now, but the wing has to be done and a lot of other details. Between escort duties and whatnot, I'm working on that. We're told that with everything else that's going on, we're going to be moving our shop from Maryland out here. I don't know how that's going to work out with the *Discovery-Enterprise* exchange, that's yet to be determined.

ROSS-NAZZAL: It must have been rewarding to receive that from your peers, that's wonderful.

MAUTNER: Very, yes. I think Valerie Neal, former NASA and our curator, was probably instrumental in getting that for us. It was pretty neat.

ROSS-NAZZAL: Rebecca, did you have any questions for Ed?

WRIGHT: Just one, and I think you might have already answered it. Did you ever come back and do anything else with *Enterprise*?

MAUTNER: I have once or twice, but it was generally just escort duty. Those were times where it was just sit around and wait for whatever the folks, predominately USA, needed. I did come back, and we did reinstall the OMS pods. That was pretty much the original team again that did that, and we brought a couple of other people in to assist because you need spotters and tag line holders.

WRIGHT: You mentioned that you would escort for whatever they needed. What were the types of things that they would be coming back for?

MAUTNER: Every time USA came here, they had a lot of supplies. Rather than transport them back, they would leave them out and we would store them in our barn, which is out in the back corner of the property. So the first thing we'd have to do is get their supplies, and that ran anywhere from tape to paints to epoxy glues.

Recently, within the past year, they came back and we took them up on a JLG man lift. They did the work, and I would just maneuver it around to a position that helped them. Like I said, "escort" sounds very static, and sometimes it is, but a lot of times there's a dynamic component, which is the most fun of all. That's how you get to know these guys and get to see what they do.

WRIGHT: Were they doing types of restoration themselves?

MAUTNER: Yes, about last April they came back to begin the process of making *Enterprise* airworthy. That involved making an assessment of all systems, and they also did the [landing gear] retracts. The main job was to get the hydraulic system working so they could retract the landing gear. Part of our position as escort was to shut down areas of that hall to keep the public away, because the machine, what they call the mule, fires up the hydraulics system, makes a lot of noise. Also there's part of the retract that there's noise involved as well.

We did a lot of work stanchioning off. Moving stanchions back, and then when it was all done, moving the stanchions closer. We were trying to do this juggle between making sure people were safe and USA had enough room to work in, and also still keeping the hall open to the public. Our whole purpose is to let them get as close to this stuff as we can.

There were a couple of times where, yes, it was pretty static, but other times we were pretty involved in helping them. And everything back here is secured. You can't get into the restrooms without our badge, so we were escorting to the restrooms. Eventually, and especially in this last trip in February where they did the final preparation for flight, the security office provided them with badges that allowed them to open all the things they had to get into. They had the same access employees had.

I think that speaks of the type of relationship that we've always felt we had with NASA, that they weren't an alien organization that comes in and invades our space but rather cohorts, colleagues that we feel—not exactly one with, our roles are different—but certainly very good friends with.

WRIGHT: Is this a very unique exhibit here compared to all the rest? Do you have any other kind of associations with other groups that come in and work on their planes?

MAUTNER: No, there's no other organization that has the relationship that NASA has with us. I think that's historically because we've been the repository of first choice for NASA, but also because Valerie Neal, who came from NASA, has maintained a very, very good relationship with all the leadership there. It's been a very collegial relationship from the very beginning. Because of that, your relationship personally to these people is much more relaxed, so it's much much easier to make friends. I have a couple buddies that I email once in a while back at the Cape [Canaveral, Florida]. It's a good relationship.

ROSS-NAZZAL: Any other last thoughts?

MAUTNER: I think I've covered the important aspects of my relationship with the Shuttle *Enterprise* and with the folks from NASA and USA. We had a good team. I think it was kind of neat because management left us alone; they left us to make a lot of our own decisions. Everybody worked with the goal in mind, and we reached the goal. We finished *Enterprise*, it really looks beautiful. It took us nine months to get it in the shape that it's in right now, and I have to say I am quite proud of how it came out.

I do recollect one of the stories that I'll tell you. When we began to strip all the paint off, we traced all of the markings—the NASA worm, the “United States” on the side, the “*Enterprise*” itself—so that after we painted it we could restore those. We noted and photographed the fact that these had been hand-brushed. Somebody had done a stencil, and then

they hand-brushed in the black color. As we began to strip the aircraft, we realized that there were other markings, other NASA worms and another “*Enterprise*” and another “United States” underneath that exterior coat of latex house paint.

We traced those as well, and at that point the curator had to make a decision. Are we going to restore it to when it was originally painted and lettered, or are we going to paint it as it was presented to us in 1985? The decision was made to paint it as it was delivered to us. Those letters were all in black, and the letters we found underneath were in lighter shades of dark gray.

At the time that we traced them back on the aircraft, the question was asked, “Well, who feels comfortable painting them back on?” I mean, none of us are professional sign painters. Out of the five of us there, four chose to do it. So what you’ll see out there is our hand-lettered letters, and they are letter perfect. They came out really, really well. Three employees and one volunteer painted them all in. That too raised our level of pride and involvement and attachment to the *Enterprise*.

I have mixed feelings about it going. On the one hand, it’s very important for us to have an orbiter, and *Discovery* is a much more significant vehicle to have in our collection, so I’m happy about that. On the other hand, all of our handwork is being sent off to somebody else. I’m not going to lose sleep over it, but I will think, how are they taking care of it? Is that beautiful paint job still squeaky clean and nice, and are all those tiles in good condition? So yes, I am concerned to some degree at it going off to other hands.

ROSS-NAZZAL: Any plans to go to New York and see her once she’s in her permanent location?

MAUTNER: No plans at this time, no.

WRIGHT: And will you be working on *Discovery* when it comes?

MAUTNER: We're not going to touch *Discovery*. This is another aspect that's pretty neat about getting *Discovery*. The ideal airplane or spacecraft to get into our collection is the one that just went on its last mission. If we could get a Boeing B-17 [aircraft] that flew a mission from England in August or September of 1944, and then was transferred right back into our hall out front, that's the idea. You don't want to touch it. You want to mount it in such fashion that you preserve the tires and take any other stresses out of it, but it would be great if it had the gunpowder stains and the engine stains and the oil stains and the rough-hewn patches that the mechanics put on the planes back in those days.

And that's how *Discovery* is coming to us. They haven't cleaned it, outside of taking out the toxic materials in all the tanks and systems, so it's not going to look like *Enterprise* at all. In fact, one of the people from NASA commented that *Enterprise* looked like a toy. I think what she meant was it looked like a model, and *Discovery* looks like a real orbiter. So we're happy about that.

WRIGHT: Well, thank you.

ROSS-NAZZAL: Thank you for spending some time with us this morning. We appreciate it.

MAUTNER: You're very welcome. It's my pleasure to do it.

[End of interview]