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BERTRAM D. AARON
INTERVIEWED BY SANDRA JOHNSON
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JOHNSON: Today is April 1, 2014. This oral history session is being conducted with Bertram Aaron at NASA's Langley Research Center in Hampton, Virginia, as part of the NACA [National Advisory Committee for Aeronautics] Oral History Project sponsored by the NASA Headquarters History Office. The interviewer is Sandra Johnson, assisted by Rebecca Wright. I want to thank you again for taking the time to meet with us today and to talk about your history with the NACA. I want to begin today by asking you how you first heard about the NACA and when you first decided to apply to come to work here, where you went to college, and how you first heard about it.

AARON: I was born in Newport News, [Virginia] so I knew about the NACA. "NACA nuts" were all over the place. I went to Virginia Tech [Virginia Polytechnic Institute and State University, Blacksburg, Virginia] and graduated in 1943 as an electrical engineer. I immediately went into the Signal Corps. I came back from the Philippines in 1946 and started to look for a job. My father had had a heart attack. He was kind of insistent that I stay in the area. I went and looked at Sperry [Gyroscope Company] in Great Neck, Long Island [New York] and a couple of other places. My dad convinced me to go down to the NACA. So, I went down to the NACA. I was offered a job. I was offered an extra 100 dollars because I was a radio amateur. It was an offer I couldn't refuse. I was living at home. That's how I started at the NACA.

JOHNSON: You were a radio amateur, as in ham radios?

AARON: As in ham radio, yes.

JOHNSON: Was that just something you did for fun, or did you learn to do that when you were in the military?

AARON: I built my first radio when I was nine years old, so I was a ham before I went into the military. I got my license when I was a senior in high school. I remember going to Norfolk [Virginia]—taking the ferry to Norfolk—taking the exam, and waiting for the letter to come.

JOHNSON: I bet that was exciting.

AARON: It was exciting. For a kid, it was very exciting.

JOHNSON: You applied to the NACA, and they gave you that extra 100 a year.

AARON: Yes, 100 a year. I think my whole salary was 3300 and some odd dollars a year. That doesn't sound like much now, but that was pretty good then.

JOHNSON: Yes, that was a lot of money back then. Where did you first get assigned? What was your first duty?

AARON: I was assigned to Instrument Research Division [IRD] and stayed there. I was hired as an electrical engineer. Later, they changed our titles to aeronautic research scientist.

JOHNSON: Talk about the IRD—that area and exactly what you were doing.

AARON: Instrumentation. Instrument research, I think, at that time was responsible for instrumenting the wind tunnels and everything else that was done at Langley that was sort of the electronics section for NACA. As I recall, Ed [Edmond C.] Buckley was the division head, and Mort [Morton J.] Stoller was the division chief engineer. Mort was a really fine engineer. Everybody liked him. It was unfortunate that Mort passed away, I think, sometime in the eighties or nineties. My first job was to go over to Physical Research and work with the people over there on the—I don't know what they called the tunnel at that time, but it was a blowdown tunnel. They were doing telemetry and Schlieren photographs of high-speed objects.

I think a lot of the work we were doing at that time was to determine supersonic and hypersonic shapes for wings, bodies, and that sort of thing. That was my first introduction to Edgerton lamps. Later on, I knew [Harold E. "Doc"] Edgerton and [Kenneth J.] Germeshausen and worked with them elsewhere, when I was in my own business. We used Edgerton flash lamps. It was a really interesting process. Interesting enough, when I was in business for myself on Long Island, one of my customers was Airborne Instrument Laboratories [AIL]. The original engineer on the job at NACA was, at that time, working for AIL when I met him—the fellow that I replaced when he left.

JOHNSON: You were talking about that process and that it was an interesting process. Can you just talk a little bit about that process with the flash lamps?

AARON: I'm trying to remember way back then. It's very difficult to recall all that.

JOHNSON: We don't need all of the exact details but just if you remember anything about what you did.

AARON: The idea was to build flash lamps and to trigger them at the proper time when the object passed a certain port and flash the lamp, so we had to complete a design and build of the flash lamps and the triggering mechanism, which, I think, was a photocell on a light beam going across the tunnel. I can't be sure, because I don't remember.

JOHNSON: These weren't things that you could just go—as they call it now, a commercial off the shelf product. You had to build them and create them.

AARON: There were no COTS in those days. You built everything.

JOHNSON: Everything was built here. When you came up with the designs, being an electrical engineer in that department, who actually physically built them? Did you physically build them, too, or was there another department that did that?

AARON: We did a lot of it, and we had techs [technicians]—very good techs. So, between the engineer and the techs, it was a hands-on deal. I remember NACA at that time was really a great place, and if you needed something, you just asked for it. I remember I needed an oscilloscope, so I just put in a req [requisite] for it. Pretty soon, the oscilloscope showed up. I don't think that's doable today.

JOHNSON: No, I don't think so, either. I think you're exactly right. On your notes, you said that you were doing—was it Schlieren photography?

AARON: Schlieren photography. I've lost track of what Schlieren photography is, but I do know you get a picture of a shockwave in front of the object. I remember we varied the Mach number by varying the atmosphere of the tunnel and the mixture of gases that we put in the tunnel and the pressure of the gases. We had a big, huge, compressed ball outside, and when the time came, the physicist in charge pushed a button. That's why it was called a blowdown tunnel, because it went down through the tunnel and out the other end. It was not very big. It was maybe—I'm strictly guessing now, but it might have been 4 feet across or 3 feet across in diameter.

JOHNSON: You had also mentioned in your notes that you didn't have any training prior to this. Was everything just on the job training and you learned from the people that were here before?

AARON: You were supposed to know. You were hired as an electrical engineer. You were supposed to be an electrical engineer.

JOHNSON: Was that difficult, or was it just part of the process and you expected that?

AARON: Well, in those days, what you didn't know you were supposed to go out and learn.

JOHNSON: Where did you do that? Did you use the library?

AARON: You read books. You didn't go on the Web. You read a book, or you talked to somebody else who was more experienced in it. One of the things I didn't put in there was that I was asked to determine a better way to communicate with Wallops Island [Wallops Flight Facility]. At that time, I was looking into microwave links and how to design a microwave link between NASA Langley and Wallops Island. I don't know whether that was ever built or not, but I learned a lot about microwave links in those days.

JOHNSON: That was kind of early on, wasn't it?

AARON: Yes.

JOHNSON: You were in the service, and then you returned from the war. You were probably in your early twenties when you started working here.

AARON: I started working here in 1946. I was born in 1922.

JOHNSON: So, you were young.

AARON: I was 22 years old.

JOHNSON: Was that pretty common? From what I've read, after the war, the volume of people changed, because they really built up during the war to do the research. Were there a lot of people leaving at that time?

AARON: There were a lot of people who left at that time. A lot of people from New York went back to New York. There were some of us who were hiring in, and I mentioned Enoch [J.] Durbin there. He was hired in the same day I did. We sat side by side on desks and became very good friends over the years. Enoch was brilliant. I remember he and I both took a class at Virginia Tech's extension in Hampton. I sort of struggled along with it. Enoch ended up teaching it.

JOHNSON: He was a good guy to know, though, if you needed anything.

AARON: He was smart. He was a very bright guy. He passed away about three years ago. He ended up as a professor emeritus at Princeton [University, New Jersey].

JOHNSON: Being younger, were there a lot of people your age starting to come into this area?

AARON: There were a lot of people my age in this area—a lot working at NACA, but there were also a lot of more experienced people there, too. I don't know exactly how many people were

there. It was not in my interest, and I didn't really care. I think most of the people that I was working with were a little bit older. Here is another name—[William D.] Morrison. I remember he used to fly to work. He had the commercial equivalent of a P-51 that he used to fly back and forth. I have forgotten what that was. There was another fellow whose name I don't remember who must have been in his fifties and hired in at that time—a very bright mathematician. Well, he knew his math. He was an electrical engineer, but he really knew his math. He also knew how to make very hot peppers. In those days, there was a lot of fun in the job. I remember the first thing we would do when we would come to work, we'd find out what Li'l Abner did the night before. We'd read the Li'l Abner [cartoon]. There was a lot of talk about the Yankees and the Dodgers, but it was the kind of a place where you did your job.

JOHNSON: What were your hours like?

AARON: I know we got off at 4:30, so we must have started at 8:00. I'm guessing. I don't remember. I do remember, though, that on Friday afternoons, at 4:29 ½, I'd try to get out of the gate before the mob, because on Friday afternoons, I would head to Baltimore [Maryland]. All of the girls in town had gotten married during World War II. I had some friends at a country club up in Baltimore, so I used to go up there every weekend.

JOHNSON: You just went up there and stayed the weekend?

AARON: Spent the weekend and came back to work on Monday morning.

JOHNSON: Were you living at home at the time?

AARON: Yeah.

JOHNSON: You enjoyed your weekends, I'm sure.

AARON: I did. They were great weekends.

JOHNSON: You mentioned the NACA nuts. People knew that they were different, but they weren't really aware of what type of research they were doing in the area. Being from this area, were you aware of exactly what was going on here before you starting working here?

AARON: I was interested in aviation and radio from the time I grew up, so I had some idea what was going on down here, but most people didn't. I don't think today most people know.

JOHNSON: I know there was that little bit of tension at first, not knowing who these new people were coming in and working.

AARON: I know we used to have a pretty good social life amongst each other. We would have beer parties in people's backyards and that sort of thing.

JOHNSON: That's what I was going to ask you about were some of the social activities and the things that were sponsored by groups at Langley. Were there just impromptu things?

AARON: They may have been. I wasn't involved with those.

JOHNSON: You mentioned also in the information that you sent that you worked on the development of a remote display for the position of the pedestal on the 584 tracking radar.

AARON: The way we got the data off the 584 radar was pretty crude. We had a machine-divided ring around the bottom of the pedestal and another on the counterweight for the antenna. We had a Mitchell camera that photographed the intersection as scales. When the radar was in use, you'd get a picture of the position of that machine-engraved ring. That was how you knew the elevation and the azimuth of the antenna. Of course, we had servos that would show you the approximate position, but these guys needed to know very close what the position was. In those days, very close was maybe one-tenth of a millimeter. Today this is crude, but in those days, that was pretty sharp. The best way to do it was to get a photograph of it, because the servos—I think they were size five servos—were just not that accurate. You could get an approximate position on the screen where they were. It wasn't a screen, it was a dial. We were looking for some way to electronically transmit that position. [With the construction of the new Flight Research Division Hanger, I was tasked to design a new antenna system for the facility. I worked intensively under Paul Vavra modifying the new SCR 584 Fire Control Radar as a then state of the art radar theodolite. Our modification became the instrumentation standard for all rocket and aircraft research until the development of the RCA instrumentation radars.

This included installation of a ring and an arc designed and manufactured at the Langley shops. These items were very precisely machine divided so that when installed on the pedestal

and counterweight of the radar antenna and the intersection would give the precise position in azimuth and elevation. This intersection was photographed with high speed Mitchel cameras and the position data was then calculated to provide the exact line of sight of the Radar. I designed the illuminating head for these cameras utilizing Edgerton flash lamps. The lamps, the cameras and the internal timing were synchronized together.

Other modifications included doubling the transmitted power from 250,000 watts to 500,000 watts. This was a challenge requiring pressurization of the solid coaxial lines and in some cases changing them to large diameter coax. The radar was required to operate off of the commercial power lines and from its own generator. I designed a switch box mounted under the radar that automatically sensed commercial or generator power and reconfigured the input circuits to accommodate what was connected. This saved a considerable amount of time and eliminated the possibility of error and damage. I was very proud of that accomplishment. No one else had set up this complex a circuit that sensed and automatically reconfigured the input circuit to match the input power source.] Digital technology had not shown up yet—not to us, anyway.

JOHNSON: That was a little prior to digital technology. Another thing you did was you would determine the best moisture-resistant coating.

AARON: Yes. What do you paint things with to keep them from corroding? I set up a little jig and fixture deal. I figured the best way to find out was to do an accelerated live test on a bunch of coatings. So, I got samples of all of the coatings I could find, coated the aluminum or whatever material it was we were trying to coat, and had a little jig that dipped it into a saline solution and lifted it out in front of a heat lamp. So, it went from hot to cold to a corrosive

environment and back up and down, and up and down, and up and down. I let that thing run for several weeks. The only thing that stood up was Spar varnish. I never forgot that.

JOHNSON: That's good to know now.

AARON: It is—Spar varnish that they use on sailboats.

JOHNSON: You mentioned that you were assigned on the modification of the 584 radar.

AARON: The SCR-584 was fire control radar. It was the most advanced fire control radar that, I think, the military had during World War II. NASA at Langley had some of these. The idea was to use those for tracking missiles and whatever else needed to be tracked, like the bombs we would drop from B-52s or B-29s. It was the azimuth ring that I was talking about before on the pedestal. We also had the same type of thing on the counterweight. Where they came together at the bottom was the junction that we photographed, so we had the elevation of the antenna, in which it was pointing, and the azimuth of the antenna, which was where it points, so we knew in space exactly where the target was that the radar was tracking.

The 584 was very good. It was a quarter megawatt transmitter. We upgraded to a half of a megawatt and put these machine-engraved rings on it, very precision rings, and modified the electronic tracking system inside the electronics so that it made a pretty good radar theodolite. I think they used that thing for years, and years, and years. Paul [H.] Vavra was the lead engineer on that—a very bright guy.

JOHNSON: The other thing you mentioned is that you were assigned the job to develop the stick force recorder for the X-1.

AARON: Yes. I was doing a lot of work with strain gauges.

JOHNSON: Why don't you just talk about those gauges a little bit and what you did with those?

AARON: The strain gauge was a piece of wire that was coiled back and forth, basically on a substrate. As you varied the pressure or the tension on the substrate, you deformed the wire slightly and pulled it. We used a very sensitive—I guess it was an ohm meter—to determine that. These things are very sensitive. I remember seeing one at the 1935 World's Fair, where they put a strain gauge on a railroad track. If you put your finger on a railroad track, you could read the depression. They're very sensitive. We used those as the sensors to measure the force on the control stick on the X-1—the X-1 rocket aircraft. You could measure how much effort the pilot took to move it forward and back. A lot of the work I did was with those strain gauges and the telemetry equipment. A good part of it was instrumenting the balsa wings. We said we were the only people who ever dropped a sewer pipe from 40,000 feet.

JOHNSON: I was going to ask you about that. I was reading that, and I thought that was pretty interesting. Explain exactly how that came about, and how you did it.

AARON: The sewer pipe simulated an aircraft body. It was heavy. What we did was we epoxied the wings to the side of it. The balsa wings—the other design team secured those. I don't know

how they did it, I wasn't involved with that. My job was to put the strain gauge onto the wings. Then, they would take them up to 20,000 feet. I think maybe it was 40,000. It was about the top of the B-29 altitude, where you have to be very careful because the B-29 engines started to heat up at that altitude. It was about as high as they would go. They'd drop them, and telemetry what the wings were doing on the way down, because they would get close to Mach 1 on the way down. There were times when, I think, it went past Mach 1, and we would be able to determine what was going on with the wings, because the strain gauges on the wings would telemetry back what was going on with the wings. We were looking for flutter.

JOHNSON: How did it telemetry back?

AARON: We had FM/AM. We used little, miniature tubes, and we built our own telemetry radio transmitters. We kept looking for smaller and smaller tubes. We ended up with little, tiny ones but nothing like they are today. It was state of the art. We had six channels. I think it was an AM transmitter, but we varied the frequency of each little, individual channel. I think these operated in 115 megahertz, but I'm not sure. I don't remember that very well anymore. They would radio the information back, and we'd pick it up at the ground station. Then, the girls would reduce the data. We were getting pretty upset when I think maybe it was Charlie [Charles A.] Taylor. He had brought in these Eckert-Mauchly [Computer Corporation] card sorting machines and eventually replaced all of the girls with the calculators with punch card machines.

JOHNSON: How big was this pipe that you dropped?

AARON: I would guess it was about the length of this table. It was about that wide. It was a sewer pipe. That was our COTS. That was commercial sewer pipe—cast iron sewer pipe.

JOHNSON: Early COTS, right? Where were you? You were talking about the ground station. Was this out at Wallops?

AARON: No, that was here. I remember one day I was out at the radar station because we were going to do a bomb drop that day. It was 100 percent overcast. We were scheduled to fly around one o'clock or so. I looked up and said, "Ain't no way they're going to fly today." I went back to the cafeteria, got some lunch, and walked outside. There wasn't a cloud in the sky. I jumped in that jeep and just barreled back out. I don't remember where the field station was. It was out in the swamp somewhere around here.

JOHNSON: When they dropped it, where did it land?

AARON: I'm not sure. I don't remember. I don't know whether it landed in the water or in the swamps. It was pretty benign. It was a piece of sewer pipe with some balsa on it. [I think they dropped these instrumented "bombs" at the Plum Tree Island bombing range."

JOHNSON: That's a long way to fall, isn't it?

AARON: It was a long way to fall. I think it was from 40,000 feet. I'm not sure. It was as high as a B-29 could go.

JOHNSON: You mentioned the computers and the women that did that work. In the area you were working in, were there computers that worked specifically with what you were doing?

AARON: There was a central group in the PRD [Physical Research Division] Building across the street. It was a big room full of girls. Each one had their Marchant calculator. I have no idea how that operation worked, because I had no contact with it whatsoever.

JOHNSON: You didn't have a one-on-one relationship with it. You just sent the data over there, and they would do the numbers and send it back to you.

AARON: The process it took—I don't know what it was. I was still young then.

JOHNSON: You didn't pay attention. You said the group was upset when they brought the regular, real computers in instead of the "girls."

AARON: No, we were just kidding, because there go the girls. I wasn't here when that really happened, but it was the beginning. I always thought that one of the things I should have done was to get myself assigned to that group and learn digital technology, but I just didn't understand the impact it was going to have.

JOHNSON: It's kind of hard sometimes to see into the future.

AARON: I was a pretty immature, young kid. Even though I'd been through World War II, there was a lot I didn't know in those days.

JOHNSON: As we all age, we can say the same thing about our younger years. Let's talk about the facility a little bit. You said you jumped in the jeep and drove over. The facility itself and the layout and just some general things about where you worked and what the area looked like that you worked in and the buildings.

AARON: It's still there. It looks exactly like it did when I was here. It was IRD on one side of the gate and PRD on the other side of the gate. The buildings are still there.

JOHNSON: Nothing has changed that way. I guess the trees have gotten a little bigger, but other than that—

AARON: A few people used to go out and run around the block back in those days. I used to walk around the block every now and then, but that was before the exercise.

JOHNSON: They had cafeterias.

AARON: They had a cafeteria. I remember it was a wooden building—not the one we have now.

JOHNSON: How did you get back and forth to work?

AARON: I carpooled with another fellow. What is now Mercury Boulevard was then called Military Highway. I lived at 6811 Huntington Avenue at 69th Street, which wasn't very far. I think I carpooled with Price. I can't think of his first name. I know he went on to marry the [daughter] of one of the car dealers. We used to kid him that he got a new car every time his ashtray filled up.

JOHNSON: One of the perks, huh? You said all of the local girls were already married, so you had to find someone elsewhere.

AARON: I didn't get married until I was 30.

JOHNSON: You had fun, though, every weekend.

AARON: Actually, I met my first wife before I left NACA in Virginia Beach at the Surf Club. She was from Brooklyn.

JOHNSON: She was a long way from home.

AARON: Yes, she was, but she had family in Norfolk.

JOHNSON: You mentioned in your notes that you travelled by bus and boat to Wallops Island to operate the 584 there.

AARON: Yes. For an aircraft operation, we did a lot of travel by bus and boat. They'd pile us all on the bus and take us over. Then, we'd get on a boat, on an LCVP [Landing Craft Vehicle Personnel], and go through the marshes. There is a bridge out there now. We'd go through the marshes, over to Wallops. It was the most beautiful beach on the east coast at that time.

JOHNSON: You had optical sights with bicycle handles.

AARON: It looked like a big set of bicycle handles; big with two handles with a little sight in the middle. You'd look at the rocket. When it took off, you'd do that. It was using the servos to communicate with the 584, so the 584 would swing right along with it. When the rocket got up out of the clutter, then the radar would see it and automatically track it.

JOHNSON: You just tracked it until it was—

AARON: We just tracked it until the radar could pick it up, because radar couldn't see it from ground clutter as it went up. There was one incident that happened, and it turned out to be almost folklore. The guys had the 584 radar in a hangar, and they were working on it one night. As it would swing around, it would light up the fluorescent bulbs in the ceiling that were in the beam as it swung around. There were some local people up there who thought the place was haunted.

JOHNSON: That's pretty funny. You also said that, when you were out at Wallops, you would do some work with the ham radio with the Wallops transmitter?

AARON: That was strictly off-record. The place would close down. We'd have supper. A lot of us were amateur radio operators then. So, there was this very nice transmitter and antenna. It was off air at night, so we'd go up and slip a ham frequency crystal in there, use one of our call signs and operate out of there. It didn't bother anybody. Nobody cared.

JOHNSON: The transmitter was a little better than the one you would have at home, I would imagine.

AARON: A lot bigger.

JOHNSON: You mentioned that they gave you extra money when you first started because you were a radio amateur. Did you use that on your job at all?

AARON: As a radio amateur, you had a lot of experience building things. You already knew pretty much the basics. It helped when I was in college, actually, because I remember my final exam in my senior year was to design a radio receiver. As a radio amateur and having done this, you knew you knew which pieces of equipment you could use and which you couldn't. Theory is fine, but in practice, there are some pros and cons that change it. So, I think it was the practical experience that a radio amateur had in those days that made it of better use to the company.

JOHNSON: They just rewarded you for having the experience.

AARON: They didn't have to train you how to solder. They didn't have to teach you how to do all of these things. You already knew. You knew how to put pieces of equipment together. You knew what worked and what didn't work. You could read the color codes on the resistors and that sort of stuff.

JOHNSON: That makes sense.

AARON: It probably saved three or four months of training.

JOHNSON: Were there some other things that you worked on that you remember during that time period?

AARON: The major things that I did up there I've already mentioned. In particular, I spent a lot of time on the strain gauges and the 584—a lot of time on that.

JOHNSON: You mentioned working on the X-1.

AARON: The stick recorder.

JOHNSON: Were you still with the NACA when it finally flew—the X-1?

AARON: Yes. I didn't leave the NACA until 1950.

JOHNSON: So, you were there. Do you remember that—when it flew for the first time?

AARON: Yes.

JOHNSON: Obviously, you couldn't watch it on television like you do now.

AARON: They didn't let me go out to see it, either.

JOHNSON: How did you hear about it?

AARON: The word went back and forth. There was communication going on all the time. Of course, NACA Langley was the lead laboratory on that job. I was just looking on the Web last night. There was a lot on the Web that I didn't realize you could find on these things. It's scattered in different places.

JOHNSON: Did you work with other engineers from other Centers at that time, like out at Dryden?

AARON: I didn't directly.

JOHNSON: You didn't have any interaction with them?

AARON: No. I knew the other Centers.

JOHNSON: You left in 1950?

AARON: I left at the end of 1950. I got tired of looking out the window. Charlie Taylor took a dim view of my thinking maybe we should get together and form a consulting operation. He didn't like that at all. I hated him for years for that, and then I realized he did me a really big favor, because otherwise, I would have been there for a long time. He got me off my butt. I had always wanted to get in military procurement, so I got in my little car and I drove to Washington [DC]. I went to the Army, the Navy, and the Air Force. I said to them, "This is what I want. If you don't have it, I'll go somewhere else." I was a cocky little guy then.

The Army guy said, "I've got just what you want. Go to Philadelphia [Pennsylvania] and talk to the chief engineer there." We used to call him "Red Fringe," because he had just a little fringe of red hair. He was a really bright guy. I went up there. The man was absolutely right. I had the most fascinating job I ever had in my life—absolutely fascinating. This was the Industrial Mobilization Division of the Signal Corps Supply Agency. Their job was to take products that the military needed that were either too expensive or too complex for private industry to do on its own and put them in production.

I hadn't been there for more than two or three weeks when the Colonel called me and he said, "We're building the DEW [Distant Early Warning] line. GE [General Electric] was building the radars, and the pulse switch tubes for the radar magnetrons was built by one man, and it is a laboratory curiosity. We need 50,000 of them next year. We get one a month and we

have to figure out which radar that one is going to work in. Go fix it." Essentially, that's what he said. He said, "Fitch will be your facilities guy, and this guy, this guy, and this guy."

I did it, but it took me two years. We had the 50,000 thyratrons. I used to hate weekends. I worked with major companies in the country and the smaller companies in the country. I put that job together. Under the Defense Production Act, I got all of the engineers from these various companies together, and that's like herding cats when you want to get them to interchange information. The engineers were reasonably willing to do it. The bosses didn't want to do it. But, we did it. It was absolutely the most fascinating thing. We figured out the physics and the chemistry behind the hydrogen thyratrons, the manufacturing techniques, and we had the whole family of thyratrons. If I was going to do it, I'd do it for all. These were big bottles. These things switched 40 million watts—40 megawatts. So, it was fun. I got married. When it took them two years to give me a raise, I quit. I quit and went into business for myself.

JOHNSON: Was that the rest of your career? Were you in business for yourself for the rest of your career?

AARON: Yes. I just hated weekends on that job. I really did. I met so many interesting people and worked with so many interesting people. It was fascinating. I learned an awful lot those two years.

JOHNSON: You made some good connections, too, I'm sure.

AARON: Yes. It wasn't the connections so much. It was what I learned from these people. It was fascinating. I was dealing with vice presidents and presidents of the major corporations in the country—GE, Westinghouse, and Sylvania and all of those people.

JOHNSON: While you were still here, though, you proposed the idea that you wanted to do this consulting, and then you felt like you didn't have as much work to do after that?

AARON: Charlie Taylor decided that he wanted me out. He figured I was a rabble rouser of some kind or other. He did not assign me another piece of work. I was sitting there in the window looking out. I could have sat there for years. They didn't fire anybody. I just couldn't sit there, look out the window, and do nothing, so I just took off and found another job, which is what he wanted me to do and which I did, so he should have been happy.

JOHNSON: As you said, it was the best thing that happened.

AARON: Those guys were really bright guys that I was working with there at NACA. They were really sharp. A lot of them went off to form their own businesses eventually.

JOHNSON: Have you kept in touch with any of them that you worked with at that time?

AARON: No. Enoch was the only person that I kept in touch with.

JOHNSON: You left, and you went to New York—the New York area?

AARON: No, I went to Philadelphia. I went to Los Angeles. From Los Angeles, I went to New York. From New York, I came back here.

JOHNSON: You decided this is where you wanted to live, since you grew up here.

AARON: Well, that wasn't the reason I came back. I didn't want to come back, but my wife, at that time, who was also born in Brooklyn—I've had three wives. I lost two to breast cancer. The second wife decided, when I brought her down to meet my mother, that she liked it here. When I sold my business, we moved back here to Williamsburg. I have not been sorry. It's a great place to live.

JOHNSON: It's beautiful. It really is beautiful. While you were working at NACA, what would you say you feel was your most significant contribution?

AARON: Probably, in the area of the flutter. A lot of work that I did was involved with the strain gauges.

JOHNSON: The strain gauges—that was all about flutter?

AARON: The strain gauges were put on the things that they were dropping. It was all instrumentation. I didn't do any earth-shaking or world-shaking work there.

JOHNSON: What you did, did make a difference, I'm sure.

AARON: Everybody's work there made a difference. That was a time when NASA was developing what has been used on aircraft for years. [Richard T.] Whitcomb was there and a lot of the other guys; very bright engineers. I was pretty stupid compared to those guys.

JOHNSON: It was also a time when the aircraft itself was changing so much.

AARON: World War II was a big boost.

JOHNSON: What was the pace of work like as far as the work you were doing? Did you have to work a lot of overtime, or was there a lot of pressure?

AARON: There wasn't very much overtime unless you worked at Wallops, and then if you had a project, you'd need to finish it, because it couldn't hand over. It was fairly leisurely, but it was work. Nobody goofed off. We had a good time at it, but nobody really goofed off. If you had a job to do, you did it, because that was expected of you, and you were expected to do it. If you goofed off, somebody knew about it right away. It didn't last long. I never saw anybody goof off. All of the people that I saw were happy. People at NACA and at NASA now, I think, are there because they like doing what they're doing. They have fun doing what they're doing, so don't screw around with them. Let them do it.

JOHNSON: Do you remember, at that time was there talk about rocketry and moving towards that at that time?

AARON: We were doing a lot of rocketry—a lot. A lot of the stuff at Wallops was all rocket-based. Actually, I did have in my notes there that Stan Howell gave a lecture in Los Angeles when I was out there in the 1950s that we had sent a rocket up, and it had gone into orbit, but the information was censored. The information was never put out. I don't know why. It was pre-Sputnik, but we were firing a lot of ex-World War II rockets, instrumenting them to get data. They did a lot of rocket research up at Wallops. That was mostly what was done up there.

JOHNSON: Were you at Wallops a lot of the time, or was that just when you were doing the radar?

AARON: That was on specific projects. I wasn't stationed there.

JOHNSON: I didn't know how often you actually went out there and did work out there.

AARON: Maybe two or three times a year for maybe a week or so. I don't think it was ever for more than a week.

JOHNSON: What time did you need to be out of here—by 2:00? Was that what you wanted?

AARON: The lecture starts at 2:00. I thought it would be nice to hear it. It's on Boeing, on the future of flight.

JOHNSON: That would be interesting. All right, well, we can certainly do that. You mentioned the reason you left NACA and that you had a great career after that. Did you ever have any regrets for not staying, knowing that they switched over to NASA?

AARON: No, I always enjoyed the work I did with NACA and the relationships I had with the guys and what I learned there, but you look forward. You can't look back.

JOHNSON: That's right. You certainly can't. What would you say was your most challenging work?

AARON: Here at NACA? The most challenging one, which I didn't get right, was trying to do that remoting of the position of the 584, trying to replace those servos with something else. It was challenging, and I didn't meet that challenge. I just couldn't do it.

JOHNSON: Was there anything we haven't talked about that you'd like to mention before we go?

AARON: I thought I put almost everything. At 92, I can't remember that much.

JOHNSON: I think you're doing pretty well for 92.

AARON: I don't think I can remember much more. If I do, I know where to find you.

JOHNSON: You do. You definitely do. We can just go ahead and end for today and get you to the lecture, so you can hear that. I do appreciate you doing this today.

AARON: It was my pleasure.

[End of interview]