WM. ROSS AIKEN

An Interview Conducted by

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INTERVIEW:	Wm. Ross Aiken
INTERVIEWER:	Jaimeson Cobleigh (by telephone)
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Cobleigh: I'd like to get a little bit of background.

Aiken: I was born on Maui, Hawaii, in 1919. My father was a dentist. My mother taught school, before she was married.

Cobleigh: Where did you go to school?

Aiken: U.C. Berkeley.

Cobleigh: What was your degree in?

Aiken: Electrical engineering.

Cobleigh: How did you get into the field of electrical engineering? Was it something you always knew that you wanted to do?

Aiken: Well, I think that's a very interesting question. When I was about 12 years old, an uncle gave me a Christmas toy. It was an electrical set. It had in it some batteries, and a small motor, and some carbon rods that you could use for a microphone. And I didn't like it at all, and I didn't even open the present and wouldn't play with it until about February. Finally I was bored one day and I opened it and started to play with it, and I haven't quit since.

Cobleigh: That's actually quite interesting. So, just basically an electrical kit got you into the whole field of engineering?

Aiken: It introduced me to electricity. Once I was shown, that was it.

Cobleigh: Okay, so after you graduated from Berkeley, what did you go on to do? Was that your undergraduate degree or your Ph.D.?

Aiken: No, I don't have a Ph.D. Well, first of all, I was supposed to be in the class of '42. But I decided to work for the summer in 1941 and get some experience, and then go back for my last year. And then the war came on, and I decided to work for a whole year. Then with war, I was frozen in my job. It seems that in those days, people who knew anything about electricity, electronics especially in communications, and who had some college were very much needed. I had three years of college, and I knew something about electricity. So I was made head of the communications department for the Kaiser Shipyards, number 2, the large one in Richmond, California. And I took care of all communication in the shipyard and on the ships that were being built there. I was classified as 1-B. You may never have heard of a classification of 1-B. There was 4-F and 1-A . But, I was one of seven people in the country that Admiral Land, the head of the U.S. Maritime Commission, certified as frozen in their jobs. I couldn't quit. I couldn't be drafted. I was there because it was necessary. So, for all the war, I was in that location. Actually, it was somewhat dangerous, maybe more than a lot of other places, except the front themselves. We had three ambulances in that one shipyard because we had so many accidents. I was saved by my hard hat once when some metal fell sixty feet from a gantry crane and hit me on the head. It made a big dent in my aluminum hat, but, it saved my life.

When the war was over, the Government suddenly drafted me. But I had had asthma as a child, so they didn't take me, because although I wasn't being affected at the time, anybody who had had asthma could not be sent overseas, and they only wanted soldiers for occupation forces. So, I was then given a 4-F classification. Then I went to work doing different things. I spent six years at the University of California Radiation Laboratory working for the AEC, (the Atomic Energy Commission) designing electronic controls for atom smashers. The first atom smasher was invented by Dr. E.O. Lawrence at the University of California. And so I worked for him in that category for six years. During that time I was put in charge of the electronics for Project Greenhouse, in 1951, at Einwetok Atoll in the Pacific. The idea was to see if hydrogen would "burn." That is, could you have a hydrogen bomb. Atom bomb, yes. But would hydrogen work but with more power than atom bombs. My job was to measure the temperature. And of course, no thermometer would go into the millions and millions of degrees. We did it by measuring the frequency of the x-rays. And you may be interested in the fact that we had blockhouses located a mile or so from the source of the explosions. They were on several islands. The blockhouses had walls five feet thick, and instead of gravel with the concrete. There were iron nuts and bolts. And so it was a very safe and very protected place from radiation. I was on another island every time these things went off. They wouldn't allow us that close.

Cobleigh: So this took place in Hawaii?

Aiken: No, this was on Eniwetok

Cobleigh: Where's that?

Aiken: It is west of Hawaii, on the other side of Johnson Island. It's a small atoll. The highest part above high sea level was about three feet. And, hydrogen did "burn," Dr. Edward Teller was right.

Cobleigh: You worked with Dr. Edward Teller on this project?

Aiken: Well, not directly. My wife worked at the University of California in the scientific personnel department. She was the secretary. And Dr. Edward Teller, the Great Dr. Edward Teller, would come in and ask her to explain his paycheck. Because he said, "I have to explain to my wife the deductions. Would you please explain it to me?" Now, here's the world's top physicist, top mathematician, coming in and asking the woman who later became my wife to explain his paycheck. And we always thought that was funny. He was a nice guy, a great guy. She knew him better than I did.

Cobleigh: So, the hydrogen bomb sort of went the way of your tube. "Oh, it won't work. It won't work… Oops, it works."

Aiken: After that, I continued working for the university laboratory for quite a while. And in the meantime, while I was there, I invented the thin cathode-ray tube. When I came back I asked the government if they were interested in it, and they said "no, they weren't." I asked the Laboratory, and they said "no, they weren't." So, the AEC and UC gave me clearance and I patented it myself.

Cobleigh: Okay, so you invented the thin cathode-ray tube while you were on Project Greenhouse, or once you were back at the University?

Aiken: No, Project Greenhouse. I was way out on that atoll.

Cobleigh: So, what prompted you to develop this tube?

Aiken: Well, I had dozens of oscilloscopes, five-inch oscilloscopes, in my blockhouses. And those tubes were very long, with a small five-inch screen, which was all we actually needed. They worked beautifully. Incidentally, you may be interested to know, we used the first F-1 lenses in our cameras. Each oscilloscope had a camera to record the one image from the explosion. And we needed to get it so fast that no camera, no lens, no film would record it. Then company in England said they could make a camera with an F-1 lens. Oh, everybody threw up his hands, "Oh, no way. You can't do that. The focal points would be in the lens, in the glass. That's terrible." But they said they could do it, and they did it. And we took delivery on them, and we used them, and they worked fine. And so that was where the F-1 lens started.

Cobleigh: Okay, so you decided to work on building a thin cathode-ray tube because you saw in your oscilloscopes how big they were?

Aiken: Yes. And there were few television sets around. I was acquainted with television, as it was in those days. And I said, "This thing is too deep, it's too clumsy. There ought to be a way of getting this electron gun away from the back." And so I thought of putting it to the side, or putting it in the bottom, so the beam is swept at an angle parallel to the screen, and now you've got a nice thin device. But of course, that wouldn't work, because how could you bend it? How could you focus it? If you bend the thing at 90 degrees, your focus is just out of kilter. Oh, you can think of a million reasons why it won't work. So, I sat down and tried to work it out, and I decided that if I think of why it won't work each time I project a possibility, I won't get there. And I think a lot of things are dropped and missed because of that attitude. So, I said, "I'm not going to worry about how it can actually function, but what do I need?" Then I started to lay out on paper the electron gun at the bottom, or the side, and how you bend it. Well, you have a deflection plate to bend it up parallel, so it will sweep, parallel to the screen. If you have one deflection plate, the focus is going to change, depending on how sharp the deflection angle. So, I came up with the multiple deflection plates, 10 or 12 deflection plates. And you can average them and get a controlled focus. Then what do you do to move the beam into the phosphor? Well, you put some deflection plates behind the phosphor. But, you can't have deflection plates and run five or six or eight or ten deflection plates at 20,000 volts. In those days, vacuum tubes wouldn't handle it, nothing would handle it. So, what do you do? Well, there again, you say "I'm not going to worry about why it won't work. This is what I need." And of course, later on I actually did design and build vacuum tubes that would handle 20,000 volts. So, I had 10 vacuum tubes and just pulsed them. And they're small; the size of your thumb. They worked fine. Then I got into solid state. Well, solid state transistors didn't exist back then, but we did know how to make solid state photo cells. So, we designed solid state photo cells that would handle thousands of volts. It wasn't difficult. I still have a couple of them around. We used those to handle the high voltage sweep. So, that's where the tube was developed, and the attitude that went into it, which I always thought was important.

Cobleigh: So, not only did you have to overcome the trouble of bending the rays, you also had to come up with something that could handle the voltage needed to bend the rays that much?

Aiken: Yes, that was one reason many people, when I told them about it, just threw up their hands and said, "You're crazy. Forget it. Don't waste your time on that."

Cobleigh: Okay, so now that you had built a tube, what happened next?

Aiken: Well, I hadn't built one. It was all on paper.

Cobleigh: Okay. And this was around what year?

Aiken: Well, I started it out at Eniwetok in 1951, and then when I got back, I continued my theoretical studies of it, and then found out that nobody was interested in handling it in the government. I was working for the government and the University of California at the time, and so I went ahead and set up a laboratory of my own in the rented basement of a branch post office. Branch post offices are rented; they are not owned by the government. I bought a vacuum system and made my own tube out of brass and plastic, and with a vacuum pump to pull the vacuum, got it going. At that point I had to look for some money. These things often cost millions of dollars to develop.

So then I looked for somebody to back it. Well, I called a number of individuals and a number of companies. Most of them just laughed. Warner Brothers in Hollywood heard about it and called, and said they would send up their Chief Engineer to look at it. My best friend was a Ph.D. in physics, and a brilliant mathematician; he looked at it and saw it working. Now, all I had was a spot I could move around. I didn't have a picture, I didn't need it just to demonstrate that it would work. And he looked at it, shook his head, and said, "I don't believe it." And then he went home, and worked all night on the math. He came back in the morning and said, "I've worked all the formulas and the math, and it will work. It will work."

That shows the different set of mind. I'm not a mathematician. But people who think that way put their faith in the math. And he did that. He's a brilliant man and a wonderful friend. After this, the gentleman came up from Warner Brothers and looked at the device. He went back to Warner Brothers and reported that it was done with mirrors. Why was it done with mirrors? "Well, it's impossible. You can't do that." So, I looked other places to find backing, and somehow or another, Dr. W.R.G. Baker, the great head of the General Electric research department, called me on the phone from Schenectady, New York. Baker asked me about it. He said, "I've heard you've got this." And I said, "Yes." Oh, by the way, when I showed it to the Hollywood man, I had hidden the gun, which was on the right side of it, shooting the beam parallel to the screen.

Cobleigh: Because you didn't want them to see any way or how you did it, because it still wasn't patented?

Aiken: Right. So, Dr. Baker could see it work, but he couldn't see how. He asked me all about it. And I said, "It's working, and I'll show it to you, but you'll have to sign a release, a patent release." You've got to protect yourself because there are people in the industry who "adopt" ideas. He said, "Now, I'm going to send my man out, and you show him how it works," and all that. And I said, "No, you sign a release, and I will show him." He got so mad he hung up the phone on me. In the meantime, I had been checking with Kaiser Executives because I had worked with them in the Shipyards and I knew some of them. They signed the release, they were very interested. So, I showed them how it worked. and we signed a contract. Kaiser wanted to enter the electronics field. The day after I signed the contract, an engineer from General Electric, arrived from Schenectady, knocked on my apartment door, and said, "I want to see the tube. Here's a release." Too late. It could have been very different.

Cobleigh: Okay, so, what happened after you signed on with the Kaiser group.

Aiken: The Kaiser group had $30,000 profit from another division that they could put into a laboratory to develop the tube. So they came up with a contract with me and signed me up as Director of Research. And they said they'd set up a laboratory wherever I wanted it. I would be Director of Research and they'd supply $30,000 a month, to start with. That was a lot of money in the 1950s. Soon after we began to get started on it, they called me up and said, "We have awfully bad news. Our auditor had made a mistake. It's not $30,000 a month profit; it's $30,000 a month loss. We can't finance this project that we signed a contract with you about." In the meantime, I knew some people at the Naval Research Laboratory, NRL, in Washington, D.C., and I guess I must have said something to one of them because they called me up and Commander George Hoover, said, "I want to see you." He flew out, and I showed him what it was all about. He said, "We need a special tube. We want what we call a "heads-up" display for navigation in airplanes so the pilot can look straight ahead through the display; even in the fog, he can see the runway, or he can see the ship he's going to land on. He can see what to do and he can land and navigate." But he said, "There's no way of doing that." Now, since then, we have projection tubes, but they project upward, into a piece of glass that reflects the picture, and you can see through it and see ahead through the windshield at the same time. So, they have "heads-up" display now, but in those days it was very radical. And he had the idea of a "heads-up" display, but there was no way of doing it. Projection tubes weren't bright enough. So he said, "I need a tube that you can see through with transparent phosphor and we can put it inside the windshield so the pilot can look through the tube, still see to pilot the plane just fine, and yet at the same time he can see a display that we would have generated with a computer. Can you do it?" I said yes. And then he said, "Okay, something else. Of course, that's got to be a flat tube." I was shocked at that. After all, you've got to have 14.7 pounds per square inch air pressure, plus at least a three to one safety factor. For glass and a big tube, that's tremendous loading.

Cobleigh: How large a tube was he looking for?

Aiken: I think it was 17in. It was for a T-2 jet trainer.

Cobleigh: Okay. Now, at this point in time, was it patented? Did you get a patent on the device?

Aiken: I had filed and that gave me protection of the date. So yes, I had filed the first patent. It turned out there were a number of patents on it, eventually. But, anyway, he said, "We also need another tube that is rectangular, and we can use it as a table in a helicopter to plot sono-buoy submarine responses (Sono-buoy is a listening device for submarines). Now, that has to be flat too, so you can write on it, just like a table."

Cobleigh: That's an interesting idea: making a tube and then writing on it.

Aiken: Yes.

Cobleigh: That's an interesting application of it.

Aiken: You could do your navigation, as the navigators in the Navy do. And you'd have displayed on it the sono-buoy responses, so you'd know the latitude and the longitude. So he said, "It's got to be real flat." Well, I said, "Yes." I thought about it a little bit, and said, "I think we can do it." So, then they decided, the Army and the Navy together, to finance the tube.

Now Kaiser did put money in it from other sources. They put in quite a bit. But the major source, or much of it, came from the government. And so we set up a laboratory in Palo Alto, California, (which was my choice) just to develop the tube. And the tube itself worked quite well, almost from the start. We had to work on the control tubes to handle the high voltages, and then the solid state to handle the high voltages. And all of it had to operate with the right speed. I had three different vacuum systems in different rooms. And we set up different tubes of different sizes. We even worked on color. We proceeded to work on what turned out to be the toughest job of all, and that was to get a glass envelope that would be perfectly flat, about two and five-eighths inches outside to outside, that would stand the air pressure plus the safety factor. We worked with one of the big glass companies, I think it was Corning. We set up our own laboratory section with ovens, and we got sections cast by Corning, back and front, like a pan, you'd have in the kitchen, only it was glass. We put the phosphor on one side. Focusing elements had to be worked out. There were some intricacies to it. On the back, we had to have deflection plates opposite the phosphor. The electron beam would go along the bottom of the tube, be deflected upward behind the phosphor, and then deflected into the phosphor by the plates, opposite and behind the phosphor. In other words, they were on the back of the tube, on the back glass. Well, there wasn't too much difficulty putting deflection plates on there. Of course, it took a lot of work to perfect them, and get the focus right and the linearity. While that was going on, we spent a lot of time working on the envelope. That was the hardest of all.

Cobleigh: When you were working with these types of projects, how many people were working with you?

Aiken: Oh, maybe 25, 30 at the maximum.

Cobleigh: So they were a pretty small group of people?

Aiken: Yes. At the same time, Commander Hoover came up with something else. He said, "We also need something to generate the display that you see on the windshield, inside of the windshield of the airplane -- a display that would show the ground, runway, or if you're on a ship the landing strip on the deck, etc." Well, there was nothing like that. And I said, "Well, we can do that, but tubes are heavy and take a lot of space." I had built a computer with tubes before, quite a large computer.

Cobleigh: So, where did you do the computer building prior to this?

Aiken: At the same place.

Cobleigh: How did you get into the building of computers?

Aiken: Well, Hoover said we had to have a computer, and you couldn't buy a computer in those days. Except the ones that took huge air-conditioned rooms from IBM. So I contacted a number of companies that might do it, and the best I got was several tons in an air-conditioned room. And you couldn't fly that. So, I had no choice, we had to build our own computer. Shockley Transistors had just come out. William Shockley and his two friends had invented the transistor. He lived near me and we met. And we were able to buy transistors from General Electric. They were putting out very simple transistors in those days, the first ones. And so we said, "Alright. We'll see what we can do." So, we set to work to design a computer that would provide north and south, east and west, all that you needed. You could program into it what you needed for the "heads-up" display, which today is common. And we did. We made a computer that was one cubic foot in size using individual transistors (I've forgotten what the weight was, but it wasn't much) that would generate the display that we needed for the windshield tube. So, we had three projects really, the tube, the envelope for the tube, and the computer. Finally we had them all ready. They all flew together and were successful flying in a T-2-V jet trainer.

Cobleigh: So, you were responsible for all three projects?

Aiken: Yes.

Cobleigh: Was there anyone you were working with?

Aiken: I had other engineers.

Cobleigh: Anyone of note?

Aiken: No.

Cobleigh: Okay. So, after you built the tube, did they begin production on it?

Aiken: Well, after we got the flat tube for the helicopter, the windshield tube (shaped like a windshield) had to have *transparent* phosphor. All the physicists and the chemists threw their hands up, "You're crazy!" But it turned out there was a man, working for NRL, Naval Research Laboratory, Charles Feldman, who deserves a lot of credit, because he developed transparent phosphor. We would send the front part of the envelope back to him, and he would put on this transparent phosphor by evaporation. We also had to have transparent deflection plates in the back of the tube. Well, that wasn't so difficult. We were able to evaporate and deposit conducting material in a vacuum system, in the back of the tubes for the deflection plate. So, we had transparent tubes in the shape of an airplane windshield, flat rectangular ones for the helicopters. Hoover said, "Okay, Kaiser produce it; we need it. We'll take it." Well, Kaiser looked at it and said, "It's going to cost millions of dollars to develop production models, set up a production plant and get into production." At that time, after World War II, there wasn't much of a market in the military, and they said, "We can't put up the money." So Kaiser went around to see who might finance it.

At that time there were numerous proposals for color tubes. Philco was one of the best. They had a tube that instead of red, blue, and green dots on the screen as you have today, had horizontal lines of alternate colors. It was very easy to control. And Philco was thinking of producing that tube. But RCA had already gone ahead with the dot tube model. So Philco was told by RCA, "If you produce that tube, we're going to have to fight you. We've got millions in this tube of ours, we can't afford to lose it, we're going to have to fight you." Philco didn't have the money to buck RCA; they weren't that big. So, the Philco tube died. Now, I don't know which would have been better. Probably the dot matrix.

Cobleigh: Yes, it probably would look better.

Aiken: However, by looking at the screen, you couldn't tell. I've seen it both ways. I've had them both working in my laboratory. There were other methods too. There was one where you had layers of phosphor, blue, green, and red. And you had three guns, each one operated at a different voltage. The lower voltage would not penetrate through the first layer, so it would excite the first layer of phosphor. Higher voltage electrons would go through the first layer at a set speed and then go into the second layer, and that would absorb them. The layer where they stopped was where they gave up their energy. Rapidly passing through a layer of phosphor did not excite any color. Their voltage was such, and the phosphor was the right thickness, so that electrons were stopped in that layer. That's where the energy was given up, and the phosphor glowed. So, the third gun would be the highest voltage, it would go through two layers and stop on the third. And it worked beautifully. And now you didn't have any matrix. You didn't have any dots or lines. So, there were three basic ways of doing it. But RCA was working hard and fast on theirs. So, Kaiser went to RCA and said, "Would you like to use our tube with your color method. Would you like to go ahead and use this thin tube?" Well, they liked it. That is, I was told by Kaiser, at the time. I don't know if I remember it accurately, but here's what I understood: RCA was ready to go ahead and sign a license agreement with us. Well, RCA didn't like the license. They wanted to control things.

Cobleigh: Understandable.

Aiken: They finally agreed to a license. But, at the last minute, I guess at a Board of Directors' Meeting for the final approval, somebody on the Board of Directors' of RCA said, "Wait a minute, we've forgotten something. How are we going to explain to our stockholders that we wasted millions of dollars on the wrong tube?" And there was silence. And that did it. They said, "No, we will not take a license." So then we went to other tube manufacturers. There were many in those days, and none of them would touch it because they already knew, like Philco, there would be a battle with RCA. "RCA will spend millions and millions, and lose money and lose money, until they put us out of the business. So we cannot go ahead." So, nobody would take it. The Navy wanted it, but there wasn't enough money in the military budget to begin to do this. They would buy tubes from us, but they would not set up production for us. So, the tube then went where the lost continent of Atlantis went. Do you know about the lost continent of Atlantis?

Cobleigh: Of course.

Aiken: Well, the lost continent of Atlantis has disappeared and is lost in the mists of time. The same thing happened to the "Aiken Thin cathode-ray tube." It became lost in the mists of time and forgotten. And even recently I've talked to engineers working in CRT research, And in display research with electrons and phosphor and they never heard of it. There were lots of articles on thin tubes in those days. I've published some myself, some of my engineers published articles. Magazines like *Modern Mechanics* and various publications like that all had these great articles about my tube. It was well known in the early 1960s. But after that, it just died. And people today, who haven't gone through the library or gone through old references from IEEE and IRE and The Society for Motion Picture and Television Engineers, and other technical and non-technical magazines won't find anything. Actually, there were two other things. About the same time as I invented the tube, a Dr. Dennis Gabor at Imperial College in London invented a similar tube. His was limited in that he only had the gun at the bottom center. It would sweep horizontally with regular electron gun deflection plates, in a plane behind the phosphor. And then he had vertical deflection plates, as I did, behind the phosphor. So, his tube was funnel shaped, a flat funnel. The electron gun would extend, 15 or 18 inches below the tube in the bottom. So, it wouldn't do what mine did and it wouldn't do what the Navy wanted, especially. Gabor went ahead and started to do some work on it. And then I found out that he had applied for patents. So we had a big patent fight that lasted for a couple of years to determine who invented it first. Well, it turned out I had invented it first. And the US government gave me the patent. .

Cobleigh: So he was still in the early theoretical stages?

Aiken: Yes. And I think he did have a vacuum system and did some experimenting, but I don't know how far he got. We finally became friends. I used to go over and see him, and he'd come over here to see me.

Cobleigh: That's good to hear.

Aiken: Yes, he'd come to California and I'd go to London. Gabor is a brilliant man. I think he was from Hungary. Dr. Gabor became very famous and got awards for inventing the hologram, where you can see a 3-D image in space in front of you, using lasers. In the hologram system you get several lasers shifting in the material and you can look in this material and actually see a 3-D image moving around. However, I had invented the flat thin TV tube first, and I was the only one who had reduced it to practice also. He did not have anything about a second deflection, or a beam parallel to the phosphor in the bottom of the tube as I had. So his tube wasn't quite the same as mine. It wasn't as extensive.

Now, in England whoever files for a patent first gets the patent. It doesn't matter who invented it first. In America, whoever reduces it to practice first gets the patent. In England he had filed first, because I didn't file right away in all foreign countries. So he got the patent, limited to his method in England. I got the patent with my method in England. I got the patent for it, in America and he didn't get any patent in America.

Cobleigh: I see that you had some other applications for it, like a 3-D data display?

Aiken: Yes, we proposed a 3-D data display. It never took off because the whole thing died. Kaiser didn't continue to finance research once we had it ready to go for production engineering.

Cobleigh: Okay, what did you do next after Kaiser stopped funding on it?

Aiken: I made other inventions. I set up my own companies to do other work.

Cobleigh: What were some of the other inventions you made?

Aiken: One of them was an electrostatic sign. You've seen buses, no doubt, with changeable message signs in the front of the bus and on the sides and in the back. I invented a changeable message sign, except mine was very, very low cost, because it was electrostatic. I had vanes, small, and sometimes quite big, that I could move and make a mosaic and display anything. It was very low cost because all these aluminum vanes were moved by electrostatic force. As a separate company, we made those for a while.

Cobleigh: If you don't mind me asking, what was the name of the company?

Aiken: Display Technology Corporation. Some people in San Francisco backed me. But, we didn't have a lot of money. And we sold them, for billboards. You know these big outdoor billboards you see as you're driving along the highway?

Cobleigh: Yes.

Aiken: Well, we had some of those. One of them was on the approach to the Bay Bridge in San Francisco, and the message was put up by a radio station in Oakland across the Bay. They changed it at will. We sold signs and manufactured for a little bit. But, we didn't have enough money to finance it properly and it died.

Cobleigh: Okay. Speaking of cost, how did the cost of making the thin tube compare to the RCA tube?

Aiken: I think it would be about the same. Today it would be less because you don't have to have any magnetic deflection mechanism to deflect the beam with the coil that would fit on the back of the tube and the drivers for it. Today all you would have would be solid state elements, and it would be very, very low cost. So, I would say that the tube itself would be comparable. Maybe a little less, because the handling may be a lot easier. It would be a lot smaller and less delicate. Of course, for a home TV, you would use a slightly curved faceplate, as you have today. And that would give it more strength, so the tube would be lighter.

Cobleigh: How well did the tube scale up? I know you said with the military you needed up to about seventeen inches. Would it have worked with larger sizes?

Aiken: Yes. We had ways of making it almost unlimited usage by putting very small columns, or pillars, inside the tube, to brace it from front to back. On a large tube, that would not be noticeable.

Cobleigh: Okay. So it did scale up well?

Aiken: That was never pursued very far.

Cobleigh: But it could have scaled up?

Aiken: Yes.

Cobleigh: Now, after you formed the Display Technology Corporation, what year was that?

Aiken: '62.

Cobleigh: What happened next?

Aiken: Well, around that time I became ill. I retired early.

Cobleigh: Okay.

Aiken: And I'm still around, many years later. I'm 77 now. I'll be 78 soon.

Cobleigh: God bless.

Aiken: Thank you. And I've been doing quite a bit of writing. I've written books on computers since I've retired. One was *Hard Disk Made Easy*. And another one on WordStar, which was the program in those days. And they sold well. I went to the two publishers in those days (this was a number of years ago now) who sold computer books. And I said, "I have these books." They said, "Boy, these are good books. Fine." I said, "Will you distribute them?" "Yeah, we'd like to distribute them. Okay, now, We only have one question, how many thousands did you sell last week?" I said, "I sold five hundred." "No, how many thousands did you sell last week and the week before?" "I sold maybe a hundred a week before. I did sell a lot last week." "Well, if you're not selling thousands a week, we're not interested. We can't handle anything that small." I went out to distribute them myself. And I had them printed and set up my own little home office here to sell them worldwide. I even got a fan letter from Israel, would you believe that? We found out that we could not sell them in Iran, because they cheated too much.

Cobleigh: What year was this?

Aiken: 1985 through 1988. We found that the people in Iran kept calling us and wanting the books. And they kept saying, "Send us five hundred, or send us a thousand

and we will sell them." So I'd send back, and I'd say, "All right, send a deposit?" "No, no, we don't do that. You send it to us." I had an awful time, because I had been told to look out for people in this world who cheat. And I did get cheated a little bit. So, I sent a few books, and they sold them, and called up and said, "We need more books." But they'd never pay. And then I found out that the worst place of all was Indonesia. They just cheated, and cheated, and cheated, and would try to take us for huge numbers of books and not pay. They just kept saying, "We'll, send <u>some</u> money." And they wouldn't. The only place that I ever actually got cheated, believe it or not, was Australia. Because I trusted them. I thought, "well that's a Christian country with Christian morals." Then I realized that it was just too much work for my wife and me to handle all this distribution worldwide, so we finally closed down.

I then started writing another book. A book on the Bible. I am an engineer, and I was taught, in engineering, to believe things, only when they're proved. I mean, something that seems odd, "Well, okay, fine, show me. Prove it."

Cobleigh: That's how a lot of scientists view the world.

Aiken: Yes.

Cobleigh: They have trouble taking things for granted.

Aiken: Well, remember, if an engineer, or a scientist, makes a mistake, the rocket blows up, right?

Cobleigh: Right.

Aiken: Or, the bridge falls. We've got a bridge here where the engineer made a mistake, a big beautiful arch bridge, and they saved it in time by putting reinforcement under it. But it almost fell down. The engineer made a mistake. He miscalculated the shrink factor in concrete, and that did it. So engineers are taught not to make mistakes. So, when I became an active Christian, I wondered, "Is this real, or is it just myth?" After all, remember in the Hindu religion the Earth is being carried around on the back of a giant turtle. Well, that didn't seem too realistic to me. So, I checked, "Did Christ exist? Was He real?" So, I looked into it. I found a huge amount of original papyrus and documents. And so I found out, "Yes, He was real. It wasn't a myth."

The book that I've written is called *History, Truth, and the Bible*. As an engineer, I was taught to be concise, stick to the subject. And I wrote this book under the consideration of the culture and the history of the Roman world that Christ lived in 2,000 years ago. And the history going back to all the manuscripts from then to when the King James Bible was written. And once you know all that, it's very fascinating. You find all kinds of things that people have wrong, that they don't understand.

Cobleigh: About what year was this written?

Aiken: Well, I just finished it this year, and I haven't had it published yet.

Cobleigh: Quite a change from developing the cathode-ray tube.

Aiken: A true statement!

Cobleigh: Okay, anything else of note that you did? Or any other inventions that you made?

Aiken: Well, I was Mayor and City Councilman for a total of ten years.

Cobleigh: What town?

Aiken: Los Altos Hills, California.

Cobleigh: When was that?

Aiken: 1960-1970.

Cobleigh: Okay, so you were an elected official while you were doing a good part of your research in the cathode-ray tube?

Aiken: Exactly. During my ten years as a Councilman, I was elected Mayor for a term, and was re-elected on a write-in ballot for a second term. Then I retired from public office because I wanted to start spending more time with my children However, I got 72% of the vote, three times.

Cobleigh: Well, I guess that says something.

Aiken: I think that might be unusual, so I'll throw that in. I don't take any credit for it; it's just that I stood where the townspeople wanted. Being an engineer, I said look, "This is what I think. This is where I am. If you like it, you'll vote for me, if you don't, you don't."

Cobleigh: It's just interesting, in that, you know, it's not what you would expect from an engineer running for office.

Aiken: Well, that's it.

Cobleigh: What prompted you to run?

Aiken: A committee came and asked me if I would run. Quite a lot of people were dissatisfied with the government and the way the city was going. And my friends knew where I stood, so, a committee came and asked me to run.

Cobleigh: Very interesting.

Aiken: I had no idea that I'd be in politics.

Cobleigh: I can imagine.

Aiken: I must say that I have a wonderful wife of 44 years, who's a lot smarter than I am. And I have two daughters, five grandchildren and a wonderful son-in-law. I'm very blessed by God.

Cobleigh: I just want to clarify, you attended which college?

Aiken: The University of California at Berkeley.

Cobleigh: Okay, and then you went there about three years, you said?

Aiken: Actually, I went to Los Angeles City College for two years, and then I went the last two years at Berkeley. I stopped to work for one summer. You see, in those days we had to put ourselves through college. So I stopped after the third year to take a year off, and then I was going to go back and finish. The War interrupted that, as I said before. And after the War I went back and finished my last year, and got my B.S.E.E. degree.

Cobleigh: B.S.E.E., Bachelor of Science and Engineering?

Aiken: Electrical engineering. Actually, I took as much mechanical as electrical, but the degree is B.S.E.E.

Cobleigh: Well, thank you very much.

Aiken: You're very welcome. I wish I could meet you on the HAM radio air. I have an old receiver here, but I don't have a transmitter at the moment.

Cobleigh: I also don't have a high enough license so that I can do long distance communication.

Aiken: Well, you will.

Cobleigh: I'm planning to, eventually.

Aiken: It's a wonderful thing to know that you're not just talking over the telephone. It's something you're doing yourself.

Cobleigh: Right.

Aiken: It gives you a good feeling.

Cobleigh: Well, thank you very much.

Aiken: Thank you, and I look forward to receiving a copy of this.

Cobleigh: Okay.

Aiken: And I hope it's what you need.