



## Episode 801, Story 1: Satelloon

Tukufu Zuberi: Our first story takes us to the dawn of the space race, and a peaceful satellite project that may have secretly helped fight the cold war. October 1957: the Soviet Union makes history with the launch of Sputnik...

*Archival: A new moon is in the sky...*

Tukufu: The world's first man-made satellite.

*Archival: You are hearing the actual signals transmitted from the earth-circling satellite.*

Tukufu: For many scientists in the United States, the sound of Sputnik is the sound of their own failure in the space race. NASA vows to strike back with a first of its own. On August 12th, 1960, the world's first communications satellite is dispatched into space, to bounce radio signals from earth back down again.

*Archival: "This is President Eisenhower speaking. It is a great personal satisfaction to participate in this first experiment in communications known as Echo."*

Tukufu: Now one man thinks he has an artifact from this turning point in the space race.

Chuck: I never thought I'd get a piece of space history in the mail.

Tukufu: I'm Tukufu Zuberi, and I'm making my way to Beverly Hills, Florida to meet Chuck Roedel. Chuck is a long time amateur radio operator...

Chuck: This is WA2MXR, Whiskey, Alpha, 2, Mike, X-ray, Romeo.

Tukufu: And he's held onto the contents of a letter that has intrigued him for years.

Chuck: Hi, I'm Chuck.



Tukufu: How you doing? Tukufu Zuberi.

Chuck: Come on in.

Tukufu: What do you got for me?

Chuck: I have what I think is a piece of NASA satellite. Here's the piece.

Tukufu: OK.

Chuck: And I also received a letter that came with it

Tukufu: Hmm. Interesting. Now where'd you get all this stuff from?

Chuck: Well I had a contact with a gentlemen in Maryland whose name was Doc. That's what I knew him on the air as.

Tukufu: Doc was also a ham radio operator. They met on the air in October 1978.

Chuck: I took some notes while I was talking to him.

Tukufu: Doc told him he had worked on a communications satellite program for NASA in the early 1960's. Echo 2 satellite. And that the satellite was made from an experimental material.

Chuck: I really couldn't understand what it was made out of. So he said if I sent him an envelope he would send me back a piece of the satellite. And he did.

Tukufu: I would think a satellite would be made of a harder material than this.

Chuck: Well, he explained this was the beginning of communication satellites and they were attempting to launch a balloon.

Tukufu: A balloon in space, is that right?



Tukufu: A satellite is any object in space that orbits a larger one. But Chuck didn't know if a balloon could be a satellite, or how it might have worked as a communications device. What do you want me to find out for you?

Chuck: I'd like to know if, first of all, if this is a piece of an NASA satellite. And if you could I'd like to know a little bit more about Doc.

Tukufu: Do you mind if I just sit here and take a look at everything for a moment?

Chuck: No, that'd be okay.

Tukufu: All right. Great. So here this guy is, he's having a conversation with somebody. He doesn't know the guy's name. He just knows him as Doc. W3HNT. Could be anybody. And they tell you they work for NASA. And they're going to send you some material. The material is about four by four inches. It's pretty light and very thin. If this was some kind of satellite, I would expect this material to be more durable. And it has this weird pink powder on one side. This pink jazz. Ugh. Who knows what that stuff is? Let's look at what the letter says. Echo 2 satelloon. I mean, what is that? Is this the name of this satellite thing, or is this the name of a project at NASA? It says this thing was 135 feet tall. Now that's a big satellite or balloon or whatever inflatable object we're talking about. I'm going to type in "Echo 2 satelloon" and see what I come up with. Echo satellites were NASA's first passive communications satellite experiment. This is interesting. On January 31st, 1958 - almost four months after Sputnik's launch - NASA joined the space age by launching its own man-made satellite - Explorer 1. But having lost the first leg of the space race to Sputnik, the United States really wanted a "first" fast. NASA responded with three in 1960, launching the first weather satellite, the first navigation satellite, and the first communications satellite - Echo. So basically this was a big thing. NASA successfully launched the first Echo satelloon into space onboard a Delta rocket in August of 1960.

*Newsreel: Echo 1 foreshadows a new era in global communications.*

Tukufu: When the rocket arrived in space, the Echo balloon somehow inflated. It then operated like a giant mirror—bouncing radio waves back to earth.



*Archival: Echo 1, the radio mirror satellite that's as bright in the northern sky as the brightest star.*

Tukufu: So the Echo was a major publicity event for the United States, something which is putting the U.S. in direct competition with the Soviet Union. But this is interesting...the U.S. shared the Echo technology with other countries. And it seems the Soviets actually participated in experiments with Echo 2, launched in 1964.

*Archival: The satellite balloon, which has reflected these words, may be used freely by any nation for similar experiments in its own interest.*

Tukufu: The Soviets called Echo 2 "the friendly Sputnik". Is Chuck's material a part of some thaw in the Cold War space race? Maybe this mysterious "Doc" can help me. Here we have the address of the guy who sent the letter. But he lists as his name his call sign: W3HNT. That's cool. Let's see if we can use that to track down his name. I find old ham radio records online, organized by call number. So I get his name. Here we are. We have Dwight Saxmann. The address is a match. Nice. But when I do a little more digging, it looks like Dwight Saxmann died in 1983. Maybe I can find some relatives...Yes, my name is Tukufu Zuberi, and I'm trying to locate a relative of a Dwight Saxmann. Oh, okay, well look, thank you very much. I leave messages. Let's see if I can get some information from NASA on Dwight Saxmann, and how he may have been involved in the Echo program. So you're not able to find any record of this person's name in your database? So the man who sent Chuck this material didn't even work for NASA? Before I attempt to solve that mystery, I want to figure out if I even have a piece of NASA satellite.

Tukufu: Hi, how you doing? I'm Tukufu Zuberi. Ron Muller is a former satellite engineer who worked on the Echo program. He meets me at the Goddard Space Flight Center in Maryland, in front of a Delta rocket. So this kind of rocket would have actually launched one of our balloons?

Ron Muller: The first launch of this rocket was Echo 1.

Tukufu: I show Ron the letter and fragment of material.

Ron: Look at that.



Tukufu: Can you say definitively that this was part of the satelloon?

Ron: Not without actually making detailed measurements. Echo 1 was just a thin layer of Mylar with aluminum coat. And Mylar at that time was very new.

Tukufu: Mylar, Ron explains, was invented by DuPont in the 1950's.

Archival: It's a remarkable new polyester film, called Mylar. Can you tear it? It's almost impossible.

Ron: Echo 2 had the Mylar structure but it had actual aluminum on the inside and the outside.

Tukufu: The aluminum was an effort to reinforce the Mylar to withstand the rigors of space. Ron's not certain if that's what we have. But he explains how NASA's special fabric was glued together in panels for a one hundred-foot balloon.

Ron: And then it gets all folded up very carefully in a "z" shaped kind of a thing. And then the whole works gets stuffed into this, into this canister very carefully. Once it was in orbit, it would inflate to full size. And that's the balloon inflating. Look at how fast that happened.

Tukufu: Wow.

Ron: And you can see it's virtually a perfect sphere. Anybody could use it. It's just flying up there, and it's just a passive thing. It's just like a mirror.

Tukufu: But Echo's role in space wasn't entirely altruistic. The U.S. Army map service was secretly very interested in a satellite flying over America's Cold War enemy.

Ron: Satellites go over everywhere. And so they couldn't really complain.

Tukufu: Up until then, it was impossible to calculate precise distances to missile targets across the Atlantic. Echo 2 solved that problem.



Ron: Each of these X's is a place in the world where we could place a portable telescope.

Tukufu: Each telescope photographed Echo as it passed overhead. Then the distance between the two points was precisely measured.

Ron: If you wanted to hit a target in Russia you had to know where that target was relative to where you started out from.

Tukufu: Now U.S. war planners aiming ballistic missiles could pinpoint strategic targets with even greater accuracy. How can I find out if my piece of Mylar was part of the Echo 2 project?

Ron: I'd take it to our experts here at the Goddard Space Flight Center.

Tukufu: Thank you very much. You've been a great help. Ron puts me in touch with material analyst Margery Sovinski. Her colleague, Debbie Thomas, is the operator of the lab's scanning electron microscope. Is there any way that you can tell me if this part of the Echo 2 project?

Debbie Thomas: I'd have to take a cross section of it.

Tukufu: With our contributor's permission, she takes a small sample of the material and prepares it for scanning.

Debbie: It's basically like a microscope except that we're going to use an electron beam.

Tukufu: Wow.

Debbie: And that goes in and excites the atoms on the surface of the sample and you can get x-rays that will give you composition.

Tukufu: Okay.

Debbie: Okay. So there's our sample.



Tukufu: So this is inside of the machine?

Debbie: This is inside of the machine, yeah. Looks like maybe two metallic layers here. Let's see, I'm going to take a spot on here. And I'm going to measure the x-rays; now that's going to tell me what I've got. Okay. Looks like aluminum.

Tukufu: So we got aluminum here?

Debbie: And this is Mylar here. So we know that we've got an aluminum sandwich, essentially. Your total thickness of your aluminum is about point three mils, thereabouts.

Tukufu: Thank you very much.

Debbie: Nice meeting you.

Tukufu: I take the lab results to Margery, who compares the measurements to the official Echo 2 specs.

Margery: If you go down the list, the total thickness for the material is very similar to what the report indicated it should be. So we've confirmed that it's very likely that the sample that you have here could have been used for the Echo 2 projects.

Tukufu: Does she have any idea what the pink powder is?

Margery: They added a fluorescent tracer to the material so that if there was a leak we'd be able to see it.

Tukufu: Margery says the powder was bright enough that mission control could see it if the Echo balloon exploded in orbit. If our powder glows under ultraviolet light, Margery says it's almost certainly Echo 2's fluorescent tracer.

Margery: Yes. It glows under ultraviolet light.



Tukufu: Is Chuck's Mylar the fallout debris from a violent explosion of an Echo 2 balloon? But if there had been such an explosion, how would Dwight Saxmann have gotten a piece of it? I catch a break. One of my earlier phone calls pays off. I get a call back from a man named Milton Saxmann. He's Dwight Saxmann's son, and he wants to meet at the former naval air station at Lakehurst, New Jersey.

Tukufu: Hello, I'm Tukufu Zuberi.

Milton Saxmann: How do you do, I'm Milt Saxxman. Yeah, it's kind of a big building.

Tukufu: The navy station at Lakehurst has a long history of working with giant balloons. This was once the hangar for the Hindenburg. Milt says this is where his father, Dwight worked on the Echo 2 balloon.

Milt: The balloon was right there.

Tukufu: Milt tells me that his father worked for a NASA subcontractor. That's why the space agency had no record of Dwight.

Tukufu: Okay. So he worked for Westinghouse?

Milt: Yes.

Tukufu: Look at this letter. Tell me, if it looks familiar. If it looks like your dad's handwriting, something he would have written.

Milt: Oh yeah. He always printed.

Tukufu: He always printed.

Milt: Always printed.





Tukufu: Okay. And do you remember what his call number was?

Milt: W3HNT.

Tukufu: W3HNT.

Milt: That was William, Three, Husky, Nasty, Tiger.

Tukufu: Milt shows me his father's knife with the call sign burnished into the side.

Milt: He was known as Antenna Doc.

Tukufu: Antenna Doc. Milt explains that NASA contracted Westinghouse to conduct a series of tests on the Echo 2 balloons here at Lakehurst.

Milt: One of the final tests was the burst test.

Tukufu: There had been an explosion, but it hadn't been in space. The technical term is a static inflation test. A balloon is literally filled with gas until it bursts. Milt can still recall how his father described it.

Milt: And it was like a just real loud dull "thunk".

Tukufu: The most serious of scientists had then behaved as children. It's a story I want to tell Chuck. So you wanted to know if your object was part of an Echo project by NASA. I show Chuck a report prepared by our Goddard scientists. His fragment was aluminum coated Mylar designed to bounce radio signals off the Echo 2 satellite.

Chuck: That, that is really something.

Tukufu: I tell him about my meeting with Milt Saxmann.



Tukufu: Your particular piece of the balloon was taken from one of the final tests where they inserted too much gas for the balloon to handle and it exploded. Milt had explained exactly how his father "Doc" had gotten hold of this scrap of material.

Milt Saxmann: You know and it split open and everybody just dived in – you know like kids with leaves?

Tukufu: Yeah.

Milt: They just dove into this balloon.

Tukufu: And your father dived, he dove in as well?

Milt: He dove in as well. Cause it was all over the place.

Tukufu: Okay. And this looks or appears to be one of those pieces that he brought home?

Milt: Oh yeah. Absolutely. Yeah, yeah.

Tukufu: This is the stuff.

Milt: Boy, that takes me back.

Tukufu: So a conversation over 30 years ago led to you having a piece of history in your closet.

Chuck: And I never understood why he would send me this. I was just on the air. Now I have this story. This is really nice. Nice to know.