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Mark Wilkinson

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Interview with Mark Wilkinson
April 9, 2011
Riverwoods Conference Center, Logan, UT.
Interviewed by: Landon Hillyard

Name: Mark Wilkinson

Date of Birth: May 26, 1969

Place of Birth: Logan, Utah

I have lived in many places in the United States. I was born here in Logan while my Dad was a graduate student at Utah State. I have lived in the State of Washington, Massachusetts, California Idaho, Texas, and then I moved back here for college.

Question: What made you decide to come back to Utah State?

It was mainly a financial decision. It was my Dad's alma mater and my parents were moving from Texas to here as I was finishing high school. I was actually looking at other colleges, I wasn't even considering this one and they offered me free room and board while I was in college. So all I had to pay for was my tuition and books.

Was that because of your good grades in high school?

I think it was more because my parents loved me. I did get good grades in high school. They wanted to help me have an opportunity to have a good education.

I'm sure your Dad was a little partial to Utah State being an alumni here and stuff.

It's a great school, great engineering program here. He was a biologist.

So he didn't have any interest in space?

Nope.

Question: What made you develop an interest in space exploration?

When I came here I decided I either wanted to major in engineering or art. There's not a lot of money in art, so practicality I decided on to major in engineering and its because of an internship I had as a high school student at a company called ?? which is a ?? company in Texas and I was their draftsman. I worked on ? charge explosives and decided I really liked engineering.

So you at that point you really hadn't thought about engineering as an interest?

Not seriously, as a high school student.

So what I actually did I got into the Air Force ROTC program and majored in electrical engineering.

Question: How did you stumble across the GAS team?

I don't even remember. I started getting involved in the space program because of an interest in aeronautics that I developed being a Air Force ROTC cadet.

So that kind of led you right into it. The GAS program let you put things up in space.

It was probably Casey Hatch who was a friend of my brother, Mike Wilkinson, who also later became a member of the GAS team. That was probably how I got into it.

Question: So who do you think the most influential team member of the GAS team was for you? Like for me it was Phil and Justin was like a mentor to teach me what the ropes are. Who was someone for you who kind of taught you what GAS was all about?

As far as another student?

Or a mentor.

Well certainly Gil Moore was involved in the program and Jan Sojka when I was a student. Unquestionably they were like mentors, but it was probably Ragu. He was the one that brought the program together and managed all the little nuts and bolts that NASA required.

Question: You guys actually have a lot of memories from the GAS team. I don't think you guys did crazy things about 2 o'clock in the morning, shoot rockets off and all kinds of stuff like that. Do you have one favorite memory?

Well the one thing I will never forget is the long drive from here down to the Cape to watch our payload take off. How can you forget that.

Right 14 hours.

It wasn't like 14 hours it was in the 40s or something. From here to the Cape and what had happened as is common with such a complex aerospace system the launch had become uncertain. Some technical problems. So they held the launch and so we looking at the watch, counting down how many hours it takes to get there and whether or not the launch was going to be on or not. Finally I can't even remember if the clock ran out and we had to leave if we were going to see it or they finally said yes the launch was on. When we left we had no time left in our schedule to sleep. So we had two mini-vans and we had three people in each mini-van and we drove straight. One person would drive, I think it was two or three hours, while the other person was shot-gun and then the other person would sleep. Every two or three hours we would rotate. We did the entire drive straight. That is a memory.

Question: Tell me about your lab experience. What experiment did you guys work on?

Most of my involvement in the GAS program was on something that never flew, which was the GROSAT(?) satellite.

What was the GROSAT satellite?

The GROSAT as we called it we had designed a small light support system to go on a plant and we had covered, we didn't have attitude control back then other than like bar magnets. We couldn't track the Sun but the technology we had in a payload that small for the money? So we basically put pernell(?) lenses on the surface of the satellite and used fiber optics to direct the sunlight in whatever phase it was incident(?) on to direct to this plant growth chamber.

Wow that's pretty ingenious.

Yeah, I didn't come up with the experiment idea.

Can the fiber optics actually transport all the necessary light?

Well there were some losses, but you know the type of plant was pretty hardy. We chose a particularly hardy species. I can't remember the name of the growth medium, but it was something that contained water and nutrients and you put the seed in. So it wasn't actual soil.

So what was the hypothesis? What were you trying to find out?

We were hoping to learn about plant growth and its effect in gravity. Of course now with the Space Station there are a lot of growth chambers up there and could of ??? some information before. We were post Challenger and they put a lot of restrictions on the GAS cans after Challenger because they were more concerned about safety. So the whole idea of launching a satellite was very uncertain ????. So the experiment never ?

So you are saying the experiment was right? It was NASA that shut it down?

The concept was good, ??? So I took the idea that somebody else had developed and I was system engineer ?? with the spacecraft(?)

Question: What were your experiences in the lab? What do you remember from the lab? Do you remember just sitting down and brain storming ideas? What was the biggest challenge you had?

There was a lot of that. Back then one of the biggest challenges we had was the batteries. We used these sealed light acid(?) batteries that were horrid. I always asked myself why didn't we just go get alkaline batteries off the shelf. We had to take these things and run them through multiple cycles to condition them to get them to this point where they wouldn't hold their optimum charge. That was just a pain to try to get that to work.

So you were going to take these batteries and put them up in the satellite to make it work?

Yeah, they were going to be the power system.

You were going to grow these plants into the canister?

Yeah the satellite would deploy from the GAS can and we had a small growth chamber, it was probably 4 to 6 inches in diameter and about the same in length(?)

It would shoot out of the canister?

It would be in that satellite. The satellite would supply power, control, communications, and we had a little camera on there to look at things. I really think that was really it. The satellite was a free flyer.

So you had all the radio systems everything in that satellite?

All of that inside this little guy. Of course true to the GAS program we contacted some aerospace companies and asked them to please send us some free solar cells.

We are excited to have Jim Elwell involved to help with the future.

??? and steel that is what kept this going as a program. You know you look at the GAS (?) and I'm sure the historians will took back and say, why didn't the University provide this for the program? At least they gave us the facilities and faculty members second to none, but why didn't they throw us a little cash now and then?

That's how it is in this world though.

Yeah, cash is strapped.

Question: Any special memories that you associate with the GAS team? How does that affect you now?

You know it was the starting point for my career. I have been working in the aerospace industry on spacecraft now for 16 years as a full time engineer.

Are you at SDL?

I am. I went from Hughes Space and Communication Company which was the original Howard Hughes company. It's now owned by, I think Boeing bought a part of it and Raytheon bought another part. It got chopped up. Last I knew Hughes was just directing it, that was it and I think they sold that and it is gone now. I went from Hughes to TRW, to a small family owned business called Seeker Engineering(?), started by a retired Air Force colonel making solid state memory (?). Just before that, before him, it was tape recorders, mechanical tape recorders.

You were making solid state memory?

Yeah, solid state data recordings ????

Then I went to NASA Jet Propulsion Laboratory and now I've been at SDL for the last five years.

Wow full cycle, you have all sorts of industries under your belt now.

Yeah, I've really bounced around a lot. Starting a family and all that moved me out of Los Angeles.

Starting a family really affects your life track after that.

Absolutely!

Question: Anything else you would like to share that will be recorded into the archive of GAS?

Lets see, as another offshoot of this there was a gentleman by the name of Dr. Gerald Soffen who when I met him was an executive at the Goddard Space Flight Center. He had been a chief project scientist on the Mars Viking missions.

The Rovers right?

No, no this was the Viking Lander back in the 70's.

He started a program at Goddard which he called the Space Academy. Which being a strictly academician had not really followed pop culture. He later renamed it to the NASA Academy because of all the implications with Star Trek and all the science fiction shows, cinchy programs. He set up this phenomenal program, it's still going now, I was one of the first year guinea pigs. He combined a summer internship with research associates, scientists, some of their top scientists at Goddard Space Flight Center. I was working with a gentleman by the name of Doug Leviton who was a physicist in optics and while I was working with him the co-star optics, which was the correction optics for the Hubble Telescope came through so I got to see all that being work on.

Wow. This is while you were an undergraduate right?

I was in the transition from being an undergraduate to become a graduate student.

So I worked with him on a program that did an absolute rotary encoder. I don't even know if they call them rotary encoders and optical since then. At that time optical encoders they couldn't track. They couldn't determine where they were, so they were always relative to a known point. Well he figured out to make one that would give an absolute position and it was incredibly accurate. As I recall it had an angular resolution of something like over a distance of a mile it discerned a tenth of an inch or something like that. It was incredible. He got the NASA Invention of the Year many years, I think it was five or six years, after I worked with him. He had finally worked out all the kinks and got the NASA Invention of the Year.

The point is that because you were in GAS, because you got into this industry, you got connections with him and you were able to work with the guy that got the NASA Invention of the Year.

Yeah, but that was only half of the program that Dr. Soffen set up. The other half we would go on these road trips to other NASA Centers, to major aerospace companies and meet the executives that were running these companies and other NASA Centers and other government agencies and we just got all this exposure to the aerospace industry. It was phenomenal, it was amazing. I was about to become a grad student in my career, but that career didn't even exist yet.

You were just super grateful to get that kind of exposure.
So it was really neat.

Question: Anything else?

Well since I mentioned the aerospace industry had the opportunity to work on lots of space programs including the Mars Rovers.

You worked on the Mars Rovers?

I worked on the Mars Rovers for JPL. So I worked on, I was the lead verification and validation engineer over the entry/decent and landing sequence for the avionics. There were a gazillion people working on it. So that was my little chunk of the pie. So I was involved in figuring out, in verification and validation, you look at the list of the requirements, what is this thing suppose to be able to do. Then you look at the test plans and say have we made sure everything its suppose to be doing gets tested.

How are you able to test that?

Well some of it is tests and some of it was just inspection and then some of it you had to go to the map and the numbers and do an analysis and come up with a, convince yourself that this is really going to work, just through strict numbers. So I basically worked out all that data to make sure, you know other people running the tests, other people developing the requirements, but I was the guy in the middle that had to make sure that everything worked out. To make sure that everything was tested that needed to be tested. For just the avionics on that one segment of the mission which was getting from outer space to solid on the ground of Mars. Which was a real nail bitter.

I can imagine, how many miles from here you are trying to land right. You just send it there and hope it all works out?

Well the spacecraft went from being an orbital spacecraft to being a Lander. So the micro-processor that was in the Rover had to go through the different modes. From a cruise phase, nine months in the hard vacuum of space, to being the count down timer to operating the landing radar that told it when to pull the parachute out. There were just so many things to go wrong. The ballistic coefficients of the heat shield on the entry vehicle and the vehicle itself were not that much different. So we were very concern that when we deployed that heat shield, got rid of it so that the radar could be exposed to find the ground. We were concerned that it would come back and hit the spacecraft. So there was a lot of analysis there to get the thing so that we were sure that it wouldn't smack. Of course if the parachute had landed on top of the vehicle after it touched down the mission would be over. So we had the parachute out and at some point we fired some retro rockets to slow it down and then we cut the parachute off and dropped the Rover so it could go in different directions. The rocket engines that slowed the Rover down continued to burn after the parachute was cut off so it would carry the parachute away.

One of the things that you never hear about in the media is the Rover had found something that was very suspect of being life. Of course you don't really announce that until you're sure. You're going to announce the information eventually, but you want to make sure you know what you're looking at before you tell people. What it turned out to be was one of the fibers off of an airbag, it was an airbag landing system and it was a thread off of an airbag system and a micro-imager found it just by chance and of course it was a biochemical structure, but it wasn't from Mars it was from the airbag.

All these kinds of experiences all came out of this program that got me involved in the aerospace industry.

Everyone I've talked to here said that that thing was the defining thing on their resume to get in graduate school.

Certainly a turning point, the kinds of schools. To be fair too it wasn't entirely the program. The program attracted those type of people. So you couldn't just grab anybody and stick them in the gas program and have them become successful aerospace engineer. It wouldn't happen.

The program attracts go getters, who get things done.

So true.

That's about all.

You did a great job. Thank you for your time.