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Interview with David Yoel

David Yoel
Utah State University

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Interview with David Yoel
April 9, 2011
Riverwoods Conference Center, Logan, UT.

Name: David Yoel

Date of Birth:

Place of Birth:

Question: Where are you from?

I live in Philadelphia.

Question: What took you out to Philadelphia?

I married a girl from Philadelphia and she wanted to raise our kids around family.

Question: Are you from Utah originally?

No, I grew up in Cleveland, Ohio. During the shuttle era I decided I wanted to work in the space program and I came across Utah State and its background in space weather and space science. I was very impressed and I decided I wanted to explore the possibility of going to school here. So I came out and met Gil just before the tenth anniversary of the Apollo 11 landing and got a tour. I met Rex Megill and he took me for a flight around the valley and I was sold. So I finished my undergraduate degree and came out here and started graduate school in physics in 1980.

Question: At what point did you decide, did you major in space engineering?

Actually it was in physics, I studied physics. I was intending to study upper atmospheric and space plasma physics and get a PhD. I had a plan to work in space science. Then the opportunity to build a Get Away Special came. The person that had been coordinating the first Get Away Special was Mary Cleave, she was a PhD student candidate and had just finished her PhD and was selected in the second shuttle astronaut program back in 1980. So she was just leaving Utah State to become an astronaut and this opening came up for somebody to be the Get Away Special project coordinator. Well I get to fly airplanes here once in a while and it worked out for her. She got to be an astronaut so maybe it will work for me and the opportunity to actually build a shuttle experiment was obviously very exciting. It was the dawn of a whole new era and brand new program so I jumped in with both feet and decided to make the Get Away Special Number One my master's thesis. I did that and we started in the fall of 1980 and we launched the experiment in June of 1982.

Question: So we have heard a lot about coordinators and such. What did that consist of?

Well the thing that was most interesting about it at the time was nobody even knew and there weren't even any safety measures published by NASA for the Get Away Special Program. So when we first received, for example, the safety review documentation it was a draft and it was literally over a foot thick. The front page would be two-thirds X'd out and a paragraph circled and then on the next page there was something else and it ended up becoming this payload safety handbook that was 50 to 75 pages but it started out being this foot tall draft that was almost

impossible to decipher. So we actually had the opportunity to kind of fumble through the process with NASA because they were doing it for the first time too. It was really very unstructured. Rex Megill and everybody here gave us all the rope we needed to go hang ourselves. They gave us the opportunity to do it ourselves. They kind of helped and guided but they didn't micromanage us. Just like today they let us do it ourselves and as long as we weren't doing something really stupid or really dangerous we just went off and did our own thing.

Question: Do you remember a moment that was most dangerous or that something might of gone wrong?

Well I remember raiding the Physics staff room down in the basement of the science building at midnight one time. We thought that was a little dangerous. The use of the composites to produce the support structure saved a lot of weight and allowed these experiments to fit in. Using all these composites was a little bit dangerous I think. The battery charging. At the time there was a lot of concern about the hydrogen generation when you were charging batteries and how that was going to cause an explosion in the canister and that sort of thing. So we came up with a fix for that, a safety solution for that. It wasn't like what they do over to Thiokol building solid rocket motors. It wasn't dangerous that way, but there were a lot of risks. The responsibility we felt we had because we were responsible for the safety of the space shuttle. We could have caused damage to the space shuttle if we had done something really stupid or hadn't thought everything through as well as we could have. We made sure we were doing everything we could so it would be safe and successful with the program. So that was a great experience. We worked really hard. I remember one time we did a 40 hour simulation. We ran 40 straight hours. There were 10 of us.

Question: Where was that at?

In the basement of CASS (Lund Hall), I guess it's still over there. The basement of the CASS building was where we had our lab. We did a 40 hour run to simulate a mission and make sure everything actually worked. We didn't have automated tools to accelerate the whole process. The controller downstairs was a tape recorder. It wasn't a solid state drive so the whole thing had to go through the normal process time. So 40 straight hours in one shot and then we did it again to do everything we could to make sure that this was going to be a successful sequence of experiments. We had to balance the thermal. We couldn't operate all the experiments simultaneously because the Sun would overheat. We needed the heat another time to keep from getting too cold. The shuttle on that mission was actually going into a cold zone where the payload bay was going to be facing away from the Sun for a long period of time. So we used the sequencing of the experiments to help balance, thermally balance the system. So a great experience. Rex Megill and I put the experiment, we took out the back seat of his airplane and flew it down to the Cape.

Question: Did you have to stop to refuel on the way?

On yea. Actually on the way down it took us two days. We flew south to New Mexico and then east across the southern part of the country because the weather was more stable. We landed in Orlando, borrowed his brother's car and drove it out to the Cape and installed the experiment in the canister. Driving back from, it was in Hanger S on the Canaveral side at Kennedy Space Center, in April, early May 1982. We finally finished the installation about 1 o'clock in the morning. So we loaded up the car, this is his brother's borrowed Volvo, there

weren't many foreign cars in the country, certainly not many Volvos and Rex didn't drive this car regularly. So we are driving across Canaveral Air Force Station to Kennedy Space Center to head west to Orlando to catch some sleep and we get pulled over by Canaveral security. It's about 2 AM, a collage kid with a beard and kind of long hair and this old guy. The back of the car was loaded with electronics and stuff and this cop couldn't figure out what the heck we were doing at the Cape and Rex couldn't find the registration. We almost got arrested, it was over an hour before the guy let us go. That was one of the scarier things that happened. I guess I could say I was the first person to almost get arrested for the Get Away Special program. So that was a real exciting trip. Then flying back I remember we stopped in, somewhere in Mississippi. We visited a friend of Rex's. We stayed at his house. We got stuck in Norman, Oklahoma for a couple of days because of a thunder storm coming across the country. We stayed in a single room, the two of us. Rex was a very economical person and he snored. It was pouring rain from morning to night for two days. It was a long wait for the weather to clear so we could fly back here. It was a great experience to be able to fly across the country in a small airplane and to install the payload.

Then we got to go down and see the launch. You have heard a lot about that tonight. There were 20 of us in three vehicles. We caravanned down to the Cape from Logan. We stopped at various sites along the way. The Worlds Fair in Knoxville and I think we stopped in Huntsville. We meet the Center's director at Marshal Space Flight Center in Huntsville. The Center director at Kennedy Space Flight Center was General Laberson(?). We got to see the launch then we drove across the Johnson Space Flight Center half-way through the mission. We stayed at Mary Cleaves house, our alumni who had been selected to be an astronaut. Then we drove out to California and made it to Edwards Air Force Base for the landing. Seven or eight days, the launch was on June 26 and the landing was on July 4. We made it all the way across the country in time for the landing. It was 18 or 20 of us in three vehicles. It was quite a road trip, 7200 miles in 21 days all together. So it was a long, long exhausting trip, but really wonderful memories.

Question: So growing up was there a certain point when you knew this was something that you wanted to do?

Well it didn't really hit me until about 1979. The shuttle era was about to dawn, I was in college at the time. I remember growing up with Mercury, Gemini, and Apollo. I think the first Mercury astronaut went up when I was in third grade or something. The Apollo mission, I stayed up all night to watch the landing on the moon as a teenager. The idea that I could actually be a part of it really hit me in the late 70s. When I found out about the program here I just really got very excited about it.

Question: So as a kid in kindergarten or throughout elementary school?

When I was very young it was either be a fireman or an astronaut. It was defiantly on my mind early on.

Question: So was your research from the Get Away Special ever used?

I was the integrator of the nine undergraduate experiments. So my main purpose was to integrate the payload and to convince NASA for the very first time to let it fly. I gave the presentation to the Johnson Space Flight Center Safety Committee. They allowed me to give the presentation. The Goddard guys were there, but I gave the presentation. I put together the safety

package. I figured out how to integrate all these different experiments together and how to sequence them. So that was my job. I wasn't a PI per se. I was a PI of the system so to speak.

So from there I was the first student to graduate with shuttle flight experience. I had a bunch of job offers. I remember at the time I even got interviewed by the campus recruiting office, that helps kids get jobs, about how I got ten job offers. It wasn't me, it was the program that got me the ten job offers. Who knows there might even be a tape over there. I don't know if they save that stuff. So I went to Boeing. I took the job at Boeing Company in Seattle and I was one of the very first people to work on the space station program in the early 80s, '83 at Boeing. Boeing eventually won the contract for the space shuttle and built it for NASA. I built and flew altogether, including GAS 1, five space shuttle payloads. That included one that was a commercial venture funded by Boeing called the crystal by data transfer project (?). It finally flew on SDS52 in 1992. At the time we were thinking we were actually going to be able to commercialize space by producing advanced materials in the absence of gravity. I still think there is a strong future for that. Some day when the launch costs get down to where it is economical to take materials up and process them and bring them back I think there is going to be certain materials where that value added is going to be justified.

Question: What investment will be justified?

There would be some semi-conductor material, some exotic metal or alloy, or some biological material. Most likely biological material would be first.

So it was five shuttle payloads and at that point I got tired waiting for flights because I was expecting the shuttle to launch every week or two. As lucky as I was with five shuttle payloads, I was building things and then waiting ten years for my next mission. So I went off into industrial manufacturing and I spent about a dozen years or so building industrial machinery. I got to build dozens and dozens of machines and then in 2002 I went to the 20th anniversary of the Get Away Special Program. Goddard had a kind of conference. I remember Andrew Auman was there, he was a student in 2002. Gil encouraged me to come and I lived just up the road about two hours in Philadelphia so I drove down with my kids and spent a day. I mentioned to Gil that I really missed the space program. A few months later I got a call from Rex Ridenoure, who is here tonight. He was not a Get Away Special student, he was a research engineer hired by Rex and Gil to look at the, help them evaluate the performance of Get Away Special to date and do a statistical study of all GAS experiments. He came up here just before the Challenger accident. Rex called me and I went to work as a contractor with him and got back into the space program in 2002. It was because of Gil also that that happened.

Is that what you are working in now?

Yes, I'm work in space in ? systems.

Drones?

Yes, I fly drones for a living. We are ? in space technologies as well.

That seems like the future for the Air Force right now.

In all sorts of applications including civil applications. Like wild fire monitoring, precision agriculture, and pipeline monitoring, responding to emergencies, flying in conditions that are dangerous for pilots. Like flying over wild fires in the mountain west at night. That's going to be one of those applications where they don't flight over fires at night because too many pilots lives have been lost flying in the mountains at night. So it's a perfect application for drones. You have military applications, but there are going to be a large number of civilian applications as well. Flying into hurricanes is another one. People aren't flying into hurricanes, not down in

the soup. But you can fly a UAV into a hurricane and get that critical data that you can't get any other way.

Question: What are some skill sets that you learned or gained from the GAS program?

Project management was definitely one. Real hands on project management experience. Tangible understanding of how you actually, how hard it is to actually, not just plan something out but to actually make it happen. It's that hands on experience that was so valuable. You don't get that working for most, for really any, company for many, many years. You don't get a chance to manage a project at a Boeing Company for years after you arrive. So having shown up with project management experience substantially accelerated my career. No question about it. I had a credibility in conversations about, for example when I was working on the space station program because I had actually built things that had flown and nobody else in the room had. People with total careers in the room might have been 500 years in careers but I had more experience than all of them because of the Get Away Special program. So I was able to stand my ground on important issues and drive the concept and design and the conversations because of this experience. So project management, real hands on experience were totally invaluable.

I'm still inspired by Gil, Rex, and Jan and the great work they have done. I try my best to pay it forward by helping other kids get a start in the space program.

Question: In a few short words if you had to sell someone on the GAS team what would you tell them?

It's just a fabulous program that will change your life!

Thanks for your time.