Preflight Interview: **Terry Wilcutt**

The STS-106 Crew Interviews with Terry Wilcutt, Mission Commander.

Terry, your NASA biography indicates that you were a high school math teacher in your native Kentucky before joining the Marines, becoming a fighter pilot and a test pilot. Where did the desire to become an astronaut come along?

Actually, I didn't have a desire to be an astronaut until much later in my Marine Corps career, as I was finishing up my test pilot career. But the desire to fly airplanes, I think, was always there. When I was very young, I remember being in the outfield, on a Little League Baseball team, and hearing jets go overhead, breaking the sound barrier, and I always thought [that] must be the most exciting job in the world. And as luck would have it, I had the opportunity to do that later on.

So a desire to fly goes way back.

Oh, it does. Again, from my early youth, I thought it must be the most exciting thing you could possibly do, to go as high and as fast as you possibly could.

I briefly mentioned a couple of them - tell us about some of the steps in your career that have, for you, led to being an astronaut.

Well, the thing is since I didn't set out to be one, some of it's kind of happenstance or I just got lucky. I was lucky enough to major in math at Western Kentucky University and that math degree later on qualified me for test pilot school, where I attended the United States Navy Test Pilot School after flying a couple of tours in F-4s and F-18s in the Marines. And being a test pilot qualified me for applying later on to NASA as a pilot astronaut, and fortunately I was lucky enough to be selected. But not having set out to be an astronaut I was fortunate that the things I had done, that were interesting to me anyway had led me to be qualified and gave me the opportunity to apply.

As you look back through your professional career and your student career, all the way back to your kidhood, do you identify a couple or a few more people who you think are really influential in some of the decisions that you made that led you to where you are?

Oh, absolutely. I think we're all influenced of course by our parents, probably most of all. But I like to think of this sort of thing as a work in progress, because it's not just your parents, it's the friends that you had, a few professors that you had, that were really extraordinary. Dr. Carroll Wells at Western, for instance…just an incredible professor; and, then later on in my Marine Corps career, a couple of people that I worked for, Keith Stalder and Jim Cartwright. I knew them when they were captains, they're both generals now…their work ethic, the way they took care of their folks, they were certainly influential in my career. Even here there's the people here at NASA, I think, that affect me and continually recharge my batteries for the same kind of thing-they take care of their people, the way they accomplish whatever task they're given. There's a couple of people here we call Batman and Superman, Ron Lee and Sean Kelly, for instance, that whenever any of their folks travel they always greet them when they come back: at the airport they're standing there waiting for them, welcoming them back. You know, guys that set examples like that, I think, continually recharge your batteries about the kind of person you'd like to be.

You made three trips to space in your career, and since your last space flight you also served a tour of duty as NASA's Director of Operations at the Russian's cosmonaut training center in Star City. All of that experience, along with your participation in the Shuttle/Mir program and a trip to the Russian space station, has all of that paid dividends for you now, working with the Russians to prepare for this ISS assembly mission?

I think so. I mean, I think any time you know more about a person's culture and background, where they live, things like that, you're better off in your relationship with them. And I have many Russians that I consider close friends now. And, of course, I have two on this mission, and they are just great people. It's difficult to tell a joke in a foreign language, but Boris does that-he will tell us jokes. Yuri Malenchenko was a commander on the Mir; [he] has a hundred and twenty-five days in space. When we're training in the Russian segments, the Service Module, the FGB, for instance, he's an expert-I mean, if we have a question most of us turn to him immediately. They are just great people. They're fun to train with, and they're really, really professional.

American space program, space shuttle program, has throughout its history, planned missions years in advance; flight crews and ground crews have had a year or more to work out the bugs and get everything ready. But you were named to command this crew only a few months before the mission was scheduled to launch. Talk about the factors that led to the addition of STS-106 to the flight schedule.

Well, the factors, you know, [were] that we were spun off of the STS-101 mission. Frankly there was just so much to do that it became obvious that one mission could not do all the work. So they split up the task and gave me three of their crewmembers to form the basis of my own crew and asked us to pick up the things that they wouldn't be able to do. And they didn't want to wait until after the Service Module launch because there were some things that needed to be done to the FGB prior to the Service Module. They had to change out some batteries, a few other things-and so we picked up their original mission, which was after the Service Module docks with station. We'll go up, connect it, you know, with an EVA, and then outfit it for the first crew to live in. There was just too much to do for 101, so they added another mission.

I mentioned that you've flown three missions before, so you've been through three training flows before. This one, I take it, is quite different than the ones before: what have been the challenges for you and your crew to get prepared?

Well, it's kind of a blessing it's only six months instead of twelve! I'm just kidding. It hasn't been that much different. When we first got assigned we front-loaded a lot of the training to get us up to speed as quickly as possible; we worked weekends and obviously, not only are we, the crew, working weekends but our training team is working weekends, too. And after we got a certain level of expertise in what the mission would require, got us back up-to-date and current in shuttle systems, then our training slacked off to more of a normal training flow right now. But it was a challenge at first. You know, part of my responsibility as Commander is not only the accomplishment of the mission but the welfare of your people. And, you know, my crewmembers have families and children, so having them work six days a week, we needed to pour on the training at first so that we could slack off and give them a little more time with their folks later in the flow. And I think all that has worked out pretty well. We're where we should be at this time in our training.

Do you think this mission, both in the circumstances of how it came to be and the amount of time allotted to get prepared for it, is more how International Space Station missions in the future are going to continue to be?

I think so. I think we'll have missions where we plan-we had to lay out a basic structure of how many flights it would take and what those flights would do-but as the task grows and the details become more and more obvious, we'll always have to add missions. You'd like to keep that to a minimum, but there's just no way you can get around that. And I think it's a tribute to the shuttle program that you have this sort of surge capability that you can take a shuttle and put it in the flow six months from a launch date, train a crew-that's a credit to our training folks-and then get ready to launch and have a successful mission. But this sort of thing won't go away; it'll be kept to a minimum but it certainly is here to stay while we're building the station.

And as in the first few times it happened, some people will look at that and think, oh my goodness; on the other hand, some people think, cool, this is fun-let's go…

Oh, it is.

Who are you? Which one are you?

Well, both. It is fun; it's a challenge and when they assigned us six months out, you know, you look at the task that's in front of you and how much training is required and you think, wow, this is going to be a lot of work. But at the same time most of the people in our Office respond to a challenge really positively, and you think, well, let's see if we can do this. And I think we're all willing to work as much as we need to work to make sure that it's pulled off successfully.

None of the goals of your mission, of preparing the Service Module for its life on orbit, are going to be possible without a successful docking to the space station, and you're the guy at the controls of the space shuttle to make that happen. Talk us through what happens on rendezvous day and describe the rendezvous profile that you must fly to bring Atlantis together with the station.

Well, it actually starts when we launch - we have to launch in plane with the International Space Station. And, then we're going to rendezvous and dock on Flight Day 3, so those first two days we spend literally catching up to the space station. We do a series of burns, adding a little more altitude and a little speed each time to bring us right up to the space station. And we usually rendezvous from below and that's what we plan to do on this flight. We'll come up from below the space station, then at about 500 feet directly below it we'll start flying around the station, and we'll just do a semicircle to the top. Then from the top we'll close gradually and we'll slow the rate we're coming together-our closure rate-to about an inch every second at the very end and bring the two spaceships together. It's not a difficult thing, but it is very delicate when you've got space vehicles that weigh 200,000 pounds apiece and you're going to bump them together, then you have to do that very carefully. And, I think we're allowed a degree tolerance, and again the closure rate has to be about an inch a second. And you said I'm at the controls, and I am through the final part of it, but getting there the Pilot, Scott Altman, will do most of the burns to actually bring us in line and make the final midcourse correction burns. Then he'll turn it over to me after he does, he'll do four of those, and then after the fourth one then I'll take the controls in the back and start flying. So, it's a team effort: each crewmember has a job and a responsibility that is critical during the rendezvous; I'll just be the one at the controls near the end, and until we actually do dock.

You described how you will have to fly half a circle around to go from, what for lack of a better descriptive term is, "under" the station to "above" the station; why is that required?

Well, the shuttle would actually interfere with ground communications with the ISS, and we want the ground stations to be able to send commands to the station during the docking. For instance, once we do dock, it's critical that [the station] goes to free drift so that both space vehicles aren't trying to control attitude. And so the ground will back up the station; it should do that automatically, and if it doesn't the ground has to be able to command. If the shuttle is docked below, obviously the shuttle gets in the way of the ground being able to send that command. So, we'll swing around to the top and dock actually looking down at the Earth through the station.

How would you compare this rendezvous and docking with the one that you flew to the Mir space station on STS-89?

It's the same thing except since we are flying around to the top of the space station, that introduces a little more complexity to it and probably will require a little more fuel to do. Fuel is critical, as we talked about earlier, because we want Scott to be able to undock and fly around the station; if I use all his propellant during my docking, then he won't get that flyaround. So, we'd rather save the gas, and we'll have to use a little more to get on top of the station.

The day after the docking is the day that Ed Lu and Yuri Malenchenko are to go outside of Atlantis on a six-and-a-half-hour space walk. It's only the second time that there's been an astronaut and cosmonaut team do a space walk from the space shuttle. What have we learned from that? What's the value of that combination? Is it going to teach Americans and Russians and the other partners in the International Space Station things that we need to know to do EVAs from the station?

Well, I don't know if "teach" is the right word, but I think it'll certainly demonstrate that we can work together. And, if you've talked to both those individuals, they are exceptionally smart, bright, and they work very well together as a team because they're both team players. And they've trained together and I'm as pleased as I could be with the way those two folks do their EVA together. They rehearse the EVA together, talk about it. And it's actually been a very fun thing to see because, you know, not too many years ago we never even dreamed of working with a cosmonaut. Now I've got two of them on my crew, two cosmonauts on my crew, and I've got an American and a cosmonaut doing an EVA together. It's very pleasant to see where we've come in such a few short years.

And in fact for this space walk, you and your crew have done space walk training not only here in Houston but also in Russia. Talk about the reasons for that and how that's worked out.

Well, the reason is because we don't have a simulator that simulates the entire space station in either place. And that is one of the difficulties we've had during training is that you can't do the total EVA practice or rehearsals in one location, so they've had to go to Russia to practice a portion of the EVA, and the other portion they practice here in America. But it's not a bad thing. [It] obviously gives our cosmonauts a chance to go home and train with their folks, but, too, it exposes us more to their culture, their training techniques, and it gives Ed a very good idea of Yuri's background and how he's likely to respond during this EVA. So it's a problem having to travel to two countries to train for the total task you have to do, but at the same time it's not bad to be exposed to their training techniques, and therefore learn something about how they'll probably respond or what they expect on their EVA.

I'd like to get you to give us a little bit of an education about what is planned to take place during this space walk. What are the tasks that Ed and Yuri have to do outside, and what's the goal of this EVA?

Well, the big one is, as you know, the Service Module will dock with the station, but it still has to be connected and so their real task is to connect through the electrical lines and the data cables from the Service Module to the rest of the station. You can boil it all down into that. It does take six-and-a-half hours. But you have to remember the station, I believe it's going to be about 100 feet long, so they're going to have to translate all the way up the length of the station to get to the very top, then take those power cables and hook up the Service Module to the rest of the station.

They only get a ride on the RMS about halfway.

That's right, and then the rest of the time it's hand-over-hand, so they'll have to translate-very carefully, because they can't bump antennas or other things that are on the outside-but you can imagine each time you move your hand, you're only gaining a couple of feet so it takes a while to get up there. They're hauling a lot of equipment with them, and while, of course, in space it doesn't weigh anything, it is bulky and again, gives you more reason to be careful.

The day after the completion of that space walk is the day that you all get to enter the station and become, in fact, the first people ever to go inside the Service Module, Zvezda, while it's on orbit. You got any sense at all, at this point, of how you're going to feel to be there for this event?

I think it'll be extraordinary, and I plan for Yuri to accompany me in there - as you know he was a Mir Commander, and he represents one of our international partners, the major one, Russia. And, it is, I think, in a sense, history, because after we finish then the thing really will be ready for the first International Space Station crew to live up there. There are sixteen nations that have come together to pull this off, and I think it's extraordinary that we were lucky enough, and that I'll have a Russian with me, that we'll open that up and set it up for the first crews to start living there. Lyndon Johnson once said, you know, nations that reach for the stars together aren't likely to start shooting at each other, and when you think about that, sixteen nations pulling together to make this happen, well, I think, there is a sense of history there. It's nice to have this piece of it.

The focus of almost everything on this mission is the Service Module, Zvezda, which has been described as the early living quarters for the station but is obviously-or, apparently-much more than that as well, and I'd like to ask you to introduce us to this module, if you will. What is there, what systems does it house, what kind of equipment does it have, what is it about this module that makes it so critical to the future of the station?

Well, of course the whole station is about people living in space, and this is the crew quarters. And when we say crew quarters it's got their sleeping compartments, it has the life support, it's got the kitchen, basically the galley, the breathing equipment to allow people to live there and recycle oxygen; water; it's got the attitude control for the entire station. It's literally…the Service Module is the life support component and the control component for the rest of the station. You have to have it- it's the place to live and provides the systems to allow you to live in the space station. There's no substitute for it, at least right now.

And yet it will arrive at the station without all of its important and major components, mostly because they weigh too much to launch. So your crew, and under your supervision, are going to be busy installing some of these important pieces of equipment and systems. What are the most important things? Is it possible to say that these are the really big ticket . . .

No, all the ones we mentioned are, and you're exactly right: the Service Module will be, ideally, you'd launch all this stuff in place and when it got there it'd be ready to go; but it's not, because of weight restraints. So what we'll do is go up there and install all those systems. We'll take them up in the shuttle and there'll also be a Progress up there with some of the equipment, and our big task-besides the EVA where we connect the electrical and data cables on the outside-inside we'll be putting in all those life support systems. And, you have to have each one of them, so I would hesitate to say one of them was more important than the other.

You and your crew are planning to spend five full days working inside the space station. How do you summarize the goals of what your crew has to do, and what are you going to be doing yourself during those five days?

Well, the five days, of course, are required because we have so much to do. But, what we'll literally do every day is, we have installation tasks, where we're installing that equipment, and we have transfer tasks: we'll be transferring food supplies, things that the first ISS crew will need on orbit. And we've split up those installation tasks. There's too many to just say, OK, you two people do all the installation tasks, so we have all trained on individual ones. We've split up the workload, and that's what we'll do. Of course the other thing I have to do is check on all of it to ensure it's all proceeding as planned, and I guess that sort of wraps it up. We've split up those tasks; it's a handful. We will work very long and very hard to make sure they're all done, and I think that'll be required because we do have a full plate.

You referred to moving supplies on board the station, which is something that was done in all of the Shuttle/Mir docking missions. But for this one there's going to be supplies coming out of the SPACEHAB in Atlantis but also out of the Progress ship docked at the other end. That's a first, to have things coming in from two different directions. Do you guys have a strategy for how to make that work?

Oh, we sure do. Again, it's just more or less "divide and conquer." Boris is going to handle all the Progress installation tasks and unloading of the Progress. The difference in this mission, since you mentioned our Mir missions and the transfer there, is that when we docked to the Mir and we transferred material we gave it to the Mir crew and they stowed it where they needed it. Well, here we have to be the ISS experts and the ISS crew, so there won't be any just handing it off to the Mir crew and basically asking them, where do you want this, or, here, this is yours to put where you want it. We have to have all that planned out and do it ourselves. So, the actual transfer and installation is a lot more difficult than the Mir transfer missions because we have to do it all ourselves. Once the first crew gets up there, then I'm sure we'll fall back to where we basically say, where do you want this stuff. Until then, though, we're stuck with the task of putting it exactly where they're going to want it, and where the people on the ground have figured out would be the best place to put it, and learning how to install it.

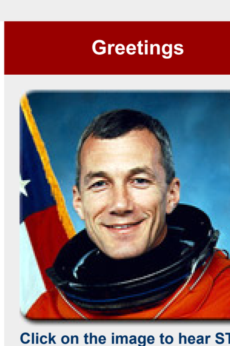
With all of that work done it'll be time for you all to leave the station, and you made a reference earlier to the fact that your Pilot, Scott Altman, is supposed to have his hands on the controls for that. But describe what happens as you go through the process of undocking from the station and flying around it to document it before you start to head home.

Well, as you just mentioned, Scott will be at the controls in the back. I'll be at the controls in the front, and we'll undock from the station. Dan Burbank will actually work the system to allow us to undock, and then, we have to back away from the station in a very tightly-contained corridor, and Scott'll make sure the orbiter stays exactly in that corridor. Then as we get a certain number of hundred feet away, he'll begin the flyaround, and it takes a lot of coordination because it involves several different systems and sensors. But Scott is at the controls and he's rehearsed this very well; he and Rick Mastracchio will be the ones looking out the back window, ensuring that we don't get any closer or any further away than we're supposed to be as we fly around, the orbiter. And while we're doing this flyaround, it's not just for Scott to get practice in handling this, the shuttle. We'll be documenting the outside of the station with photography, and we have engineers back here that study those photographs and study whether, for instance, even the paint would be peeling on the station or any other things that look different or out of configuration. And we use that on the ground for future EVA planning as well as more or less documenting how the station is doing in that environment.

The success of your mission is critical to establishing this space station as a permanent place for people from this planet to go. The fact that you're willing to fly in space and do it yourself tells me that you think that's important. Finally, I'd like to ask you to tell us why: what's the importance of establishing this space station? What do you believe it's going to lead us to?

Oh, I think absolutely it'll lead to breakthroughs in new medicines and new materials; we really do go to space to make life better on Earth. And, we go to space to explore, also, and that exploration, hopefully, will lead to a better life on Earth. I honestly believe the space station is a stepping-stone to a trip to Mars. I think the American people want us to go to Mars and expect us to get there eventually, and you can't do that without a space station-we need to learn how to live longer and longer periods in space. But as far as my involvement in it, when I came to NASA I had hopes that I would do a mission, part of our old Mission to Planet Earth where we would study the environment and the changes that the Earth was going through, and I hoped that I would do a mission, eventually, to help build a space station. And of course I'm getting ready to achieve the second one of those goals, but the space station, no kidding, we mentioned that you had sixteen nations here on Earth that have come together to pull this off, and that, the fact that sixteen nations are willing to invest in making this happen tells you that a lot of people think this is very, very important. And not just for the new materials, the new medicines, things like that; but also for the inspiration, I think, and the national pride. Well, it's really something to look up in the night sky and see something that is as big as a football field going overhead and thinking that you have human beings from each of those nations that will serve on that, doing research, all pulling together to do the same thing and that is make life better down here on Earth. And I think that space station gives us all those.

Greetings



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Crew Interviews

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