Return To Flight

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Preflight Interview: Eileen Collins **02.23.05**

The STS-114 Crew Interview with Eileen Collins, commander

You have a job that kids all over America just dream of having. Is being an astronaut what you always wanted to do?

Well, when I was in high school I wanted to be a teacher. In fact, I did have an opportunity to teach when I was in college. I did some student teaching and some assistant teaching. You know, someday I'm going to go back to teaching again, and in fact I had the opportunity to teach three years during my Air Force career at the Air Force Academy. I find that the experiences that I have now are something that I can share and that I want to share in the classroom, and maybe even, on a larger basis. I have a lot of respect for teachers, and that's something I've wanted to do and something I'll do again someday.

I've heard you say before that you fell in love with flying well before high school.

Image to right: STS-114 Commander Eileen Collins inspects a T-38 aircraft at Ellington Field, near the Johnson Space Center in Houston. Credit: NASA

Well, when I was a, a young child -- I'm going back to maybe third or fourth grade -- I started reading about flying. The space program was really just in its infancy back then. I remember the Mercury and the Gemini programs and I was very interested in that. So, I, I think through there wasn't much on television back in those days about, other than the news. I got most of my information through reading, and also through my home town in my experience at summer camp. I never had the opportunities to fly gliders myself but we have a soaring field in Elmira, New York, that really inspired me when I was a young child that someday I was going to have an opportunity to do that.

Tell me what you did in terms of your education and your career that has ultimately led you to, to the point, eventually, where you were qualified to become an astronaut.

Well, I'm going to go all the way back to grammar school. I took math and science because it was required in grammar school, and I don't really remember having a particular interest in that in grammar school over anything else I was taking. Whether it was English or social studies; I think I pretty much was equally interested. It wasn't until high school I started realizing that I like math and I like science. I wasn't the best in the class, and I didn't always get A's, but I liked what I did in those subjects. When I graduated from high school I had to make a decision about what I was going to do with my life. I knew I wanted to teach, and I thought I'd go on and be a math teacher. So I think there was a little bit of maybe a bug inside of me that said, math is your thing. My father wanted me to be an accountant. Maybe he wanted me to do his income taxes for him, I don't know. But I went on in math and science at a community college, and then my last two years in college I majored in math. I wasn't really sure what I wanted to do, specifically what type of career field I was going to go into, I just knew that I wanted to, pursue that interest. Now, I will say that I talk to young people nowadays who say, "I just can't do math, it's too hard." I don't accept that. I think math is hard for everybody. It's easier for some than others, but it's the kind of thing that if you work at it long enough, you're going to get it, and once you get it, you find that you have a love for it. Math is almost like music -- there's like a natural thing to it. And, and it's not really just a science, it's an art. So, that's why I pursued math all the way up through graduate school.

You also had the opportunity to use a career in the Air Force to help you do those things.

Well, as a pilot in the Air Force I used my background in math and science not as much as the courses that I took in engineering, which definitely applied to my flying. And I found that I was a better pilot because I had a solid technical background, although it's not necessarily required that you have a technical background to fly airplanes. I think it just makes it a little bit, a little bit easier and maybe a little bit more enjoyable as you go through the, the learning stage, as you go through pilot training. So that, that helped, and I, I take the opportunity here to encourage young people. If you're not really sure what you want to do, I think that you really give yourself a lot more options if you keep a good, solid mathematical background in your academic environment. You'll have more options available later in life, whether you decide to become a pilot or an engineer or, or teach. We have such a technical society nowadays that that math is really essential.

Who are your inspirations, your heroes, growing up?

Well, I'm often asked who my heroes are, and, you know, is there, is there one person you'd like to name. I never like to name one person or even a few people, because then I feel like I would be leaving out some, some very important influences in my life. But I can say, in general, my parents clearly have been a positive influence on me. You know, parents aren't perfect; my parents have never told me that the way they brought me up was absolutely perfect. Parents make mistakes bringing up children -- I'm a parent now and I know I make mistakes. But I think the key thing is that my parents always let me know that they loved me and whatever I wanted to do in my life they would support that. I'm the same way now with my children. So, I think that that was a very important foundation that I had, and it gave me the confidence to go on and, and choose a rather unusual career, because I knew that I was going to have the support of my parents, and I still do today. Other people that have influenced me have been teachers, of course, throughout my grammar, high school, and college, but in particular I'd like to emphasize the bosses that I had in the Air Force. The Air Force was a wonderful place to work. I, I really lived in the Air Force; it was, it was my life for the longest time. I had bosses, my leaders, my supervisors or managers, whatever you want to say, who'd ask, "What do you want to do in your next job?" I'd say, "Well, I think I'd like to be a test pilot." And they'd say, "Yeah, you can do that, and here's what you ought to do." When I said I thought I'd like to apply to the astronaut program, they'd say, "You would make a good astronaut. Let's get your career going in that direction." So I've had some great support from the Air Force. The military is a great place to be -- you get a lot of responsibility and you get, you get a lot of support. And I like the fact that, what I did in the Air Force was, I really felt, making an impact. Lastly, I'd like to say that the heroes were the astronauts that have gone before me and the test pilots and women pilots who flew back in World War II and the, the women who went through the medical testing for the Mercury program. All of these people that I read about as I grew up through high school and college have influenced me in a positive way.

I wanted to also ask you about other hobbies or interests in all the free time that you have when you're not preparing to fly this mission.

Well, astronauts have very little free time when they're training for a mission. When I get home from work I make sure I study something every night, whether it's a Shuttle-related systems-type thing, or if it's reading mail that applies to a procedure that will be affecting our mission or taking care of an issue to make sure that my crew is trained properly. I do work when I get home. I only do it to the point that I, that I end up feeling good about it, that I've made a positive impact. I like to spend time with my family, and that's very important to me. There's been a time in my life when I did a lot of crazy things like riding motorcycles around the state of Oklahoma; I think I'm kind of an explorer at heart and I like to travel. And I've flown airplanes, non-NASA airplanes, around the country, going to different air shows and, and learning about airplanes and the history of aviation. Those are kind of the things that I enjoy. And I've also, had a, have a couple of telescopes that I enjoy looking at the night sky -- unfortunately Houston's night sky isn't quite as clear as Colorado's. In the years that I lived up there I got to do some observing, and really inspire an interest in astronomy. I do have a lot of interests on the side, and one of the challenges of the astronaut program, especially when you're training for a mission, is to try to continue to enjoy the things that you like to do in life as you prepare for the mission. In my case, and I think in all of, for all of my crew, we have to cut back on our, the things that we enjoy doing, at least for this period of our lives, because training for this mission and being 100-percent prepared for everything we have to do is the most important thing to me right now, so that's where I'm concentrating all of my efforts.

We always would assume that an astronaut understands the risks that are involved in the job they do, and I guess it's probably even clearer to us since the loss of Columbia and its crew. Tell me why you feel this job is worth that risk, for you.

Image to left: Collins participates in a training exercise at the Johnson Space Center. Credit: NASA

I am a huge believer in human exploration. Just think about the history of our country and the history of the world. People have flourished around this planet because I think we humans have something inside of us, a need to explore. And I think some people have it more than others. You have the people who 500 years ago got on these old ships and sailed across the Atlantic Ocean or they sailed across the Pacific Ocean, looking for something new, looking for a better life, looking for a better economy, a way to make money. Whatever they were looking for, they were explorers. And we still have people today that like to do that. For me, it's almost a need to explore. I like to get out and do new things and see new things. When it comes to flying in space, we're taking very, very small steps. We're flying the Space Shuttle right now, we're building a Space Station, we're going to go on from the Space Station, back to the moon and on to Mars. To me, it is very important for humans to get off the planet and go do these things. Because I believe in this so much, I think that yes, there is risk in space travel, but I think that it's safe enough that I'm willing to take the risk. I think it's much, much safer than what our ancestors did in traveling across the Atlantic Ocean in an old ship. Frankly, I think they were crazy doing that, but, but they wanted to do that, and we need to carry on the human exploration of the universe that we live in. I'm honored to be part of that and I'm proud to be part of it. I want to be able to hand on that belief or enthusiasm that I have to the younger generation because I want us to continue to explore.

How does your family deal with the risks that are involved in your job?

Well, my family very much supports what I'm doing. My parents have never once asked me to stop doing this job. They know how much I believe in what I'm doing, and I think they really support what I'm doing, too. They support the overall purpose of human exploration of space. Now I'm married and I have two small children, and they understand how much I love what I'm doing. I come home and I ask them, "What did you do today?," I tell them what I did. They've been out to my job; they've seen the simulators, they've seen the T-38s, and it's exciting for them, too. So the way I see it is we're all in this together, and I have great support from my family.

It's been more than two years since Columbia and its crew were lost. Eileen, what was it like for you as an astronaut to deal with the reality of the fact that an accident had claimed the lives of seven of your friends?

Well, that's a tough question. I think now the way I'd like to deal with that question is, I'd like to talk about the future. We will always remember Columbia and its crew. We fly knowing that there's risk, and the risk that's probably going to get us is something that's unknown. We have flown a very safe, extremely safe, Space Shuttle program since the Challenger accident; it was 17 years between Challenger and Columbia. The program I felt was run very, very safely. I have very high confidence in flying the Shuttle orbiters, very high confidence in the people, in the program. But there are risks in spaceflight and there are unknowns. We try to understand as much of it as we can. The Columbia astronauts understood what the risks were. I think we had gotten to a point where we were getting pretty confident because we had 17 years. We had a couple of times when we didn't fly because we had to go fix something, and we fixed it successfully and we'd get flying again. It's time to move on. We will always remember our friends, but it's time to take what they lived for and what they believed in -- space exploration -- and move on and get the Shuttle flying again. We need to get the Space Station built, and I know that's what they would want us to do. And that's not the end of it. From there we're going to go on to the moon and Mars. People have given their lives throughout history in the name of making the Earth a better place to live for everybody. I certainly consider the Columbia and the Challenger. The whole history of the space program is part of moving on and making life better for people on Earth. I want to carry on their work on through the Shuttle, the Station, and the space exploration initiative. I think that's the way I see it now, and that's the way I will continue to feel, throughout this flight and, and even afterwards. Have you and your crewmates talked about ways that you can honor their memory and their spirit while you're flying your mission? Well, we're certainly going to do something on this mission to remember Columbia and its crew, something as simple as flying a, a photograph of the crew and displaying it where we can see it every day. We can remember them, and say a prayer for them every day in space. I certainly will continue to remember them and between now and, and when we actually fly the mission we're going to have some things to, to remember them that I think will be special.

The Columbia Accident Investigation Board pinpointed physical causes for the loss of Columbia and specified mechanical fixes to make flying the Shuttle a safer thing to do. I'm going to ask you to, to briefly assess the improvements that have been made in trying to eliminate debris and to detect and repair damage that's been done by the Shuttle.

And be brief at the same time? [Laughs] maybe we can take this chronologically from, from the design of the external tank. We didn't redesign the entire tank but the parts of the tank with the foam on the ET that we knew could potentially fall off and become a debris hazard. Those areas have been redesigned. And I have confidence in those redesigns. But just to make sure that we didn't miss anything, we have several things that we're going to do to check that. This is going to be the most-photographed Space Shuttle mission that's ever launched, believe me. We're going to have cameras on the ground, on the external tank, on the Shuttle and cameras on airplanes that will be flying during the ascent itself. I have no doubt we're going to have plenty of pictures of this launch. Our crew will be taking pictures of the external tank after it separates. On Flight Day 2 we're going to be doing an exterior inspection with cameras and lasers, of the wing leading edge and the underside of the Shuttle. On Flight Day 3 we're going to do a pitch-around maneuver as we approach the Space Station so the Station crew can look at us. I have no doubt that if there's any damage, we're going to know it. So, I think that is kind of the brunt of the Columbia recommendations. They also had a recommendation that if there is damage, we would be able to repair it. We're not going to be able to repair every potential kind of damage that could happen to the exterior of the Shuttle, but we're, we will have ways to repair some types of damage. That's still being developed and will continue to be developed even after our flight.

Let me ask you more about that point. As you've noted, repair procedures are still being developed, still being tested, certified, and yet the Shuttle program's confident in going ahead with this flight even as those, those things are still being developed. You're comfortable with that approach?

I'm comfortable with where we are right now on getting the Shuttle ready to fly again. Everything is not going to be 100 percent perfect when we fly Discovery the first flight after the Columbia accident. If we waited for everything to be perfect we'd probably never get off the ground. But I'm confident enough that we have a good, solid plan in place and the risks that are left out there are so minimal that, having said that I'm ready to fly with the plan that we have right now. Repairing the exterior of a Shuttle is a, or a re-entry vehicle in general is a very, very difficult thing to do, as we have learned since the Columbia accident. In fact we learned 20-plus years ago when we originally tried to develop repair techniques back in the early days of the Shuttle. It's a very difficult mechanical process, a chemical process in, in getting, getting a repair so it can re-enter with these very, very tight requirements to help the re-entry vehicle survive up to 3,000 degrees coming back to Earth. What we have to do, what we have done, is eliminate the source of the debris, or the source of critical debris, off the external tank; I believe we've done that. The next thing is to make sure that may, maybe, if that didn't work, that we know it didn't work and we're doing that with the inspection. And then the third layer of redundancy or layer of protection, I guess you could say, would be the repair. You know, where, where is the damage. Is it wing leading edge? Is it tile? Is it on the top of the wing? On the bottom of the wing? They could all use a, a different type of repair technique. So it's not just one type of repair we're trying to develop but many different

types; very complicated process. If you wait until you completely perfect every type of repair that you would need, is that the right thing we need to do? The way I see it is, we're safe to fly. We can get this mission off successfully. We need to get back to the Space Station. We need to continue with the exploration. I myself and my crew are ready to fly with what we have today. But, I believe we need to continue, even after Discovery flies, to refine the repair techniques that we've worked on, and we need to continue looking in the research and development area for new ideas and new concepts.

You're well aware that there are thousands of people all across the country who've been working for these past two years, and will be working in the future, on continuing to make improvements and, and develop these repair techniques. What are your thoughts about the contributions and the efforts that are made by all these other people?

From where I sit I am just so impressed of the work that's been done, and I'm so proud of the people across the country that have been supporting the Return to Flight effort, whether it's with the repair or the inspection or just getting the Shuttle ready to fly again. It's been very difficult, because as we have gone through this process and we've been learning. We'll say, "hey, we need to go fix this now." And sometimes we had to actually take a little bit of a setback and go work on a different direction, work on a different piece of hardware, whether it was dealing with repair or just getting the Shuttle ready to fly again. So there have been setbacks over the past two years, and the people that work in the Shuttle program have taken on those challenges and they've gone and they've gotten it ready. Now is the time for them to see the fruits of their work. People are starting to get excited now. We're getting close to launch. We're going to see this mission launch, fly successfully, and land. I don't know how I could possibly put it into words, my thanks to everybody who has worked so hard and not given up hope. Space exploration is hard, but we're going to take that challenge and we're going to make it happen. And I just, I have nothing but the utmost thanks and, and pride for the people that have made that happen.

What has it meant for you to get the opportunity to go to the NASA Centers and meet those folks?

Well, our crew has made an effort to get, to get around to the people that support the main engine program, the boosters, obviously the external tank and the orbiter project itself. We have actually wanted to go meet these folks so we've made calls and set up visits to the different factories. It's been hard because there's many places to visit and we still have to train at the same time, but we've made it a priority. It means very much to us and to our crew. Not only do we get to meet the people that work on our flight hardware but we learn in that process, about the very detailed parts of the hardware that you normally wouldn't learn in your day-to-day training. You actually have to get out to the factories and see this happen. It's been a real good experience for us, and it's something that I know we'll get a chance to do this again after the flight. I'm looking forward to it. It's good; it motivates us, too.

Image to right: Collins, right, helps Mission Specialist Soichi Noguchi to put on his spacesuit gloves during a training run at the Neutral Buoyancy Laboratory. Credit: NASA

Beyond the physical causes, CAIB cited organizational and human factors inside NASA that were also responsible for the loss of Columbia -- the management system and the safety culture. Do you see changes that have been made for the better in those areas in the last two years?

Clearly there have been changes in our organization, our culture, the way we do things; There have been some very specific changes that have been made and more subtle changes. But I want to say right up front that no organization is perfect. I don't think NASA as an organization will ever be perfect. What makes us really good is that we recognize we're looking for where we can do better, where are our faults. We are in a, position where we've got some problems. Let's identify them, let's put something into place, something that's really measurable, that's really concrete. If the organization is not working as well as it could in this area, let's implement a change. And not only do we look for that and then implement something to help make it better with the inputs of the folks that actually do the day-to-day work, but it's out there for the whole country to listen to. For the past two years since the accident, we've been reading about the NASA culture. I have worked at other companies. Every company, every organization, has these kinds of problems. And I would challenge the rest of the world to take a look at what we're doing at NASA. I'm proud of what we're doing; we're taking steps to make our organization stronger. And this really applies to any company, even to schools, and even to family units, people that work together on a day-to-day basis. It will never be perfect because people aren't perfect, but I'm still proud of the fact that we have taken these steps and we've gotten better.

STS-114 is called LF-1. What does LF-1 mean? What are the goals of this mission?

The LF stands for logistics flight. Primarily STS-114 is for resupply, servicing, and repair of the International Space Station. We also have an objective of the flight that's equally as important and that's the test. You could call this a test and logistics flight because the testing that we're doing is for the recommendations that came about after the accident in the inspecting, inspecting the exterior of the orbiter and the external tank and testing repair methods. So we really have, I see it as, as two major objectives on the flight.

Now, the International Space Station has been kept supplied over the last two years using Russian launch vehicles. But they have comparatively small cargo capacities, Progress and Soyuz compared to the Space Shuttle, and that has posed some challenges. Is re-flying Shuttles and the larger cargo capacity critical to the future of the Station?

Yes, without a doubt. We need the Space Shuttles to continue with the International Space Station. If we want to, if we want

the International Space Station to do the original mission, which is scientific research on orbit, we must have the Shuttles to, to complete that objective.

Well, let's talk about some of the big steps in the flight. In the very first few hours you're going to be confirming some aspects of the redesign of the external tank. Tell me a little bit about what's involved in getting the data back to the ground from all the old and new cameras that you have, as well as a new set of sensors built into the wing leading edges.

Right after main engine cutoff, right after the ascent, we're going to pitch the orbiter around, take photographs of the external tank before it re-enters the Earth's atmosphere.We'll be taking actually digital photographs as well as video. Both of those cameras have the ability to downlink that data; we will do that before we go to bed on Flight Day 1. We'll be sending it over a Ku-band communication system, and we have a procedure in place on orbit to make that happen. If for some reason we can't get it down on Flight Day 1, we can get it down on Flight Day 2. If we can't get it down via the Shuttle system due to a malfunction, we can get it down through the Space Station, so we have a plan for that. We also have wing leading edge sensors: they're, they're like accelerometers that are planted under the, both wing leading edges. If we get hit by something during the ascent, that would be detected by these accelerometers. But that data needs to be gathered by us as a crew on board into a digital file; we'll do that after main engine cutoff on Flight Day 1. That file will also be downlinked to the ground on Flight Day 1. They will be able to see peak data, you know, was, was there a hit on the wing and, if, and they'll know where it was so if they think, well, the left wing panel number ten got, got hit in this location, we will go out on Flight Day 2 and we'll do a focused inspection. We're going to inspect that area anyway, but we'll do a focused inspection on any areas that, that were hit. We don't expect to see any hits but at least we'll have this. The third big item would be the Flight Day 2 inspection where we just do a general inspection of the wing leading edges. That'll be with a camera and two lasers on the end of the 50-foot boom extension on the Shuttle arm. It's going to be challenging to downlink that but we'll get it all to the ground; if we don't get it all in Flight Day 2 we, we hope to get it down by Flight Day 4.

Pictures have been taken of the external tank after separation on every mission up until now. What's different this time?

The difference now is the priority is higher. We have a specific need because we've done a redesign to the tank, we removed the bipod foam and we've replaced it with heaters. We still want to look at the bipod area, and see how it made it through the ascent. We specifically want to look at the flange area which separates the intertank from the hydrogen tank. And, and we want to look at the sides of the tank. This is so important, it's such a high priority, that the Shuttle program is scheduling our launch for daytime, and they're, in fact the launch will be scheduled at a time such that we still have sunlight after we're in orbit and separate from the external tank, and, and that's how high a priority it is. I would just say that from the crew's point of view we're training this Flight Day 1 procedure over and over and over again so, so we can almost do it blindfolded. That's how high priority it is for me.

Image to left: Collins inspects Space Shuttle hardware at the Kennedy Space Center. She is wearing clean room attire to protect the shuttle's electronics from contamination. Credit: NASA

You also referred to the inspections you do on Flight Day 2. Tell me a little bit about the new Orbiter Boom Sensor System and how it's designed to learn whether or not the Shuttle has sustained any damage.

The Orbiter Boom Sensor System (we call it the OBSS or the, just the boom for short) is a robot arm. It's 50 feet long, but it is designed to be grappled by the Shuttle robot arm, and that'll give us approximately 100 feet of, of extension that we can use to look in areas under the orbiter that we normally wouldn't be able to reach. On the end of the boom is a camera and two lasers. The two completely different lasers are redundant. They could both do the same job but they're different enough that for different conditions, that we've got some redundancy there. We also have another small camera that we're using for clearance to make sure that, as we move this arm around, we don't accidentally hit the orbiter somewhere. That data will be taken on Flight Day 2. We're, we're not sure exactly how much time it's going to take, we'll learn that when we fly the mission. Remember, this is a, a test flight, and what we learn hopefully will help inspections on future missions to do it more efficient. The data will be downlinked. One of the lasers will be video data, the other laser will be a data in a file so there are different ways to downlink this data. It's going to be tough. This is not an easy job. It's going to be a long day. I think that we have a plan in place. We have four crewmembers working on the inspection, and they're going to rotate in and out so the fatigue factor won't set in. We're going to be making subjective comments on the flight to help as we, as we do this. We're like test pilots and we're trying to look at a better way to make this happen, a more efficient and a, and a safer way. I would say it probably will be 80 percent of our duties on, on Flight Day 2. Some of it will spill over into Flight Day 4, most likely, but we'll be ready for that.

The inspections are going to continue into the final phases of your docking to the Station as well. Talk about the plan to allow inspection of the upper and lower surfaces of Discovery as you get close to ISS.

Well, as we do the rendezvous on Flight, about the middle of Flight Day 3, we're coming in from below the Space Station with the top of the orbiter approaching so we can see the Space Station out our overhead windows. Six hundred feet below the Station we'll start a pitch-around maneuver, and it goes very slow -- it's less than one degree per second -- and we'll expose the bottom of the orbiter to the crew on the Space Station. They have windows, they have digital cameras with long lens, so they can get a very focused view of both the upper side of the orbiter as well as the tiles underneath. They have a very specific

plan of certain areas that they are looking at. They have a mapping test plan, so to speak, of what we want the pictures of. So they'll get those pictures and they'll downlink them as soon as possible after we do this rendezvous pitch-around maneuver. The ground should have them easily before the end of the day on Flight Day 3. And then after we dock, we'll be going back out again with the, with the Shuttle arm to take a look. Maybe they saw in the pitch-around maneuver that there was a gouge in the tiles. We'll be able to go under with our lasers on Flight Day 4 or later and get a focused inspection on that area, and then we'll know if it's something that we need to repair or not.

I don't want to not pay attention to the fact that you're going to get to fly the great, big Shuttle and bump it up against the International Space Station in space. Are you looking forward to getting to, to do that flying?

I have a lot of confidence in, in the safety of the rendezvous pitch-around maneuver. In fact, the more I fly it, the easier it gets. This will be my first time to actually fly the orbiter itself in to dock with the Space Station. I've flown as a pilot before and I've supported dockings as I watched my commander fly it in, but this will be my first time to do it myself. But let me say that I consider the rendezvous and the docking as teamwork. It's a team task. Jim Kelly is backing me up; he's my backup pilot, and he's giving me range and range rate. He's watching the sensors. He's available to operate the Shuttle systems as we do the rendezvous. Wendy Lawrence is shooting a handheld laser which also will give me range and range rate, and she's working the cameras. Charlie Camarda is also working cameras. He's got the docking system. They're all talking to me; they're reading procedures to me; they're telling me range and range rate. I have a fantastic crew. It's like music, watching these guys as they go through their rendezvous training. They're fantastic. They're just a great resource. I don't think I could fly the rendezvous without these guys. So I'm really looking forward to doing it.

This will be your first time to fly a rendezvous; it'll be your second time to visit a space station, the first time for this one. Have you given any thought to what you think it's going to be like to be there, to open that hatch and have Shuttle crews return to the Space Station?

Well, I've put a lot of thought into what we're going to do, opening the hatch, going onto the International Space Station, greeting our crewmembers. Expedition 11 will be Sergei Krikalev and John Phillips. And I know they're going to be happy to see us because we're going to bring some surprises to them. We'll have a welcome ceremony. We've trained for, on the International Space Station mock-ups here at Johnson Space Center, and as I do that I kind of imagine what it's going to look like, what are we going to do, how are we going to help out the mission, do the transfer. I'm very much looking forward to it. This is my fourth flight. I did want to fly a fourth flight, because it was an opportunity for me to go somewhere I had never been, and that's the International Space Station. So now I have the opportunity to do that, and I'm just, I'm very much looking forward to it.

As you've noted earlier, a big activity during the docked phase of the mission is going to be spacewalks, and part of your training in the past two years has focused on the EVA techniques for repairing possible damage to Shuttle tiles. How involved have you and your crew been in the development of the techniques that might, that you're going to test out?

It's been necessary for our EVA crewmembers, our spacewalk crewmembers, to be involved almost on a day-to-day basis with the development of repair techniques. They have been doing that. They've been practicing with, with the tools and with the material that are going to be used. It's been very important because when you get close to Shuttle launch you just don't have a whole lot of extra time to go train things. These guys are trained, not for every single task but for most of the tasks that have been developed over the past two years. They're at a point right now where they know most of what they're going to need to know to do the mission. That really not only helps with our confidence level, but it helps us develop the right techniques.

Let's talk about the spacewalk that is now referred to as a test, to test out some of these techniques that have been developed. In general terms, what is it that is planned to take place during that EVA?

Well, you'll see we're taking up a tile repair board, it's going to sit in the aft port side, left side, of the Shuttle payload bay right next to our gyroscope, and it has a top on it. The crewmembers will go out and, and open up the tile repair board cover, and they'll have tools that they'll set up around the Station and they'll practice some of the techniques that we have put in place. Some of these are still to be determined. They'll meet whatever test objectives have been laid out by the engineers. The samples that get repaired will be brought back after the mission and tested in a facility here at Johnson Space Center to see how would they have survived a real entry, samples that were actually repaired in space. And that's a critical part of the certification process.

There are additional spacewalks planned for your mission. Tell me about what the operations are on those days.

Another major spacewalk on the flight is the Control Moment Gyro. We call them CMGs. It's a huge, 600-pound sphere that will be changed out on board. The Z1 truss, is a truss segment just above the U.S. Node. Those four gyroscopes there are used to control the attitude of the Space Station. One of them failed in June of 2002, and we need to replace this gyroscope because you need four of them when the Space Station is larger. So this is a very important spacewalk for us. I have a high amount of confidence. We've been training it for a long time, and we have good flight-tested hardware that we're taking up to do this changeout. It's going to take 6-1/2 to 7 hours to actually do the task. The other spacewalk on the flight is an External Stowage Platform. It's, it's basically a spare parts platform that we'll be attaching to the U.S. airlock, just to the forward part of the airlock. This is a, a 6,000-pound piece of metal that has spare parts that are already mounted -- we call them ORUs or orbital replacement units -- spare parts that will be used in the future if a primary component on the Station fails. We'll have a spare part right there on orbit so the crew can go out and, and make the change. Future Shuttle missions will take up more spare parts to put on the platform. It's important for the long life of the Station that we have this spare parts garage available. And

we'll have time during that spacewalk to do some other things, too.

Mission concludes when you take the MPLM back into your payload bay, you'll undock, and come home. The last big event on the flight, the entry and the landing, is going to get more attention than probably any other entry and landing has, maybe ever. What are your thoughts about that part of this flight?

Image to right: Collins prepares for her role as commander during a spacewalk training session. Credit: NASA

Well just like any other segment of the flight we're training for the deorbit prep, the deorbit burn, the entry, and the landing. We break it up into different pieces and we train for that. I think back to my re-entries on my other flights. It is a very exciting part of the mission. You can see the Earth below you. You're traveling at Mach 25 over the surface of the Earth -- technically you're still in space. If you're coming in at night you can see the orbiter glow around you. It's really just a fantastic experience. I don't want to be distracted by that. We have a job on the orbiter, monitoring our entry attitude, our air speeds, the orbiter systems. Is the flight control system doing what it's supposed to do? So we actually have a job on orbit. I try not to think about the distractions that are going on around me. I try to just focus on getting my job done. The entry goes very fast, as I just said; next thing you know, you're flying the heading alignment cone at Kennedy Space Center or Edwards, wherever your landing site is. It's like the time just speeds up, and next thing you know you're landing. So I'm going to, as I did in my last flight, just revert to my training, the Shuttle Training Aircraft, I just pretend I'm flying a Shuttle Training Aircraft. It's such good training that it actually translates well to the actual orbiter. The difference is you're going from a zero g environment on the real day to one g, which feels a lot more like, like one g the day you launched. It's quite a physiological change to your body when you come in and land. So we're landing under those stresses. My crew making calls to me, and I've got the ground calling, you know, what are the winds -- we've had the support from the Shuttle Training Aircraft. I feel like all this training that I've done is finally going to come together and I'm going to focus on the landing. I try not to let the distractions come into play, and it'll be very, very procedure-oriented and very by the book.

I've heard it said that STS-114 opens a new chapter in space exploration, the one that's going to transform a Vision for Space Exploration into a reality. Do you agree?

Well, I see STS-114 as the next step in getting people off the planet and onto the moon and on to Mars, which is our nation's Vision for Space Exploration right now. To do that, to get to the moon and to put a plan together to get on to Mars, we really need to complete the International Space Station to test what we're going to be doing when we're so far away from Earth that we may not have a way to get back quickly and safely. We've got to test as much as we can on the International Space Station to guarantee the safety and the success of the future missions. Now, to finish the International Space Station we've got to get the Shuttle flying again, and 114 is the next step. Obviously, we're going to get the logistics up to the Space Station. Our purpose, I see more specifically, is to get the Station from two crewmembers to three crewmembers. If we get three crewmembers up there we can do more science. We're doing minimal science on the Station right now. We have so much potential to do more. We've got to re-supply the Station with STS-114 and the missions to follow us, get back to three crewmembers on Station, and, and get back to doing more science. But keep in mind that we're still learning on the Space Station now, even with two crewmembers. I believe we're learning a lot in just technical, in-flight maintenance-type of issues. But I also believe we just need to get more science up there.

So, is your mission critical to the future of the Station and, therefore, our future as explorers?

Well, I would have to say that all the Shuttle missions, from now until we declare the Station's complete. Whatever date that happens to be, STS-114 is the first of those missions. It's going to be a visible mission; it's going to prove that, yes, we do have the Shuttles flying again, but it's not the only mission. We can't do it with just one Shuttle mission. The flight right after ours is going to be very similar to what we're doing but they're going to take up the rest of the logistics that need to be there. The flight after that, STS-115, is taking up a truss segment and we're going to have more truss segments. We've had the Node 2 that'll be going up, in a couple of years. All of these are very, very important. STS-114 is just one piece of the series of Shuttle flights that need to fly. We've got to prove that it's safe to get the Shuttle flying again, and we have the confidence to do that.

+ Read Collins' 2004 interview.

› Back To Top

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