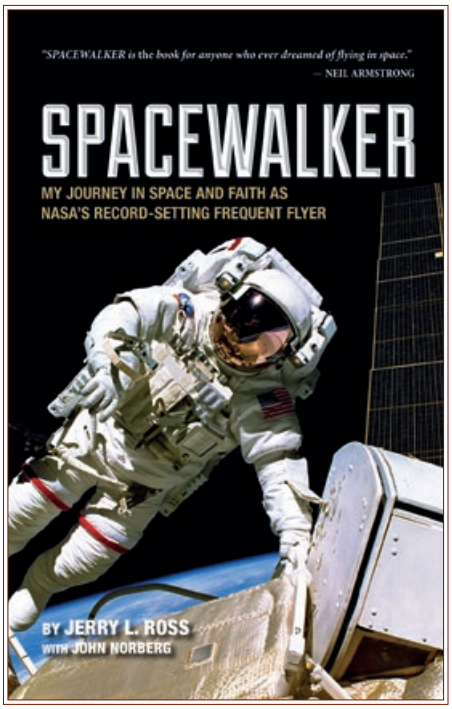
By Merryl Azriel

Space Walker:
The Story of Astronaut Jerry Ross



Jerry Ross' account of his time as an astronaut. – Credits: Purdue University Press

In January 2012, Astronaut Jerry Ross retired from NASA after a 32 year career. He was there for the first Shuttle flight, and the last. He broke the record for most spaceflights – seven – and became NASA's Extravehicular Activity (EVA) expert. He was one of two members of the Silver Team, a pair of spacewalking astronauts who were also grandfathers. After a full career doing the job he'd dreamed of from age ten, his vehicle was finally retired and it was his turn too. Suddenly confronted with a wide open calendar, free of the ever-changing Shuttle schedule that for three decades could yank him away from his family at a moment's notice, Ross knew exactly what he had to do first: write it all down.

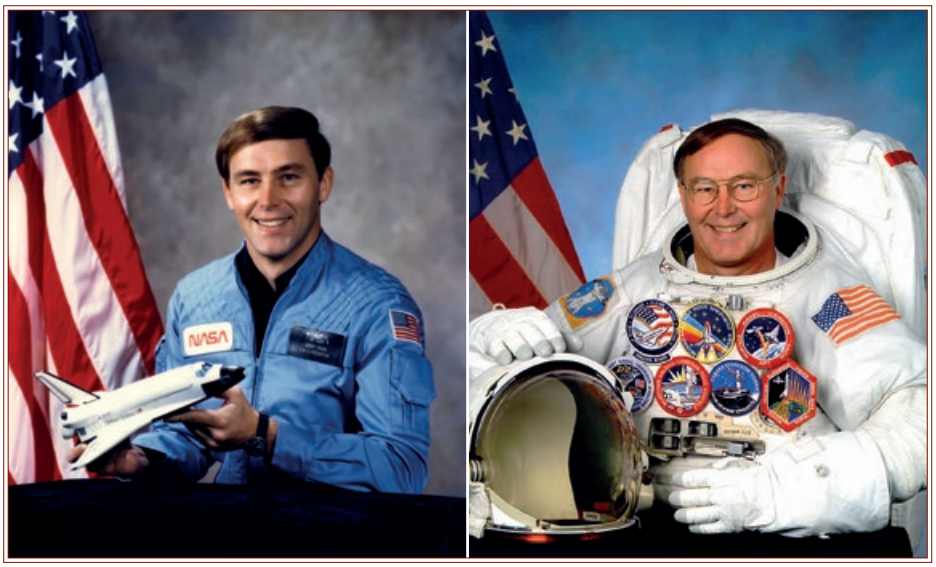
One year later, Ross' book, co-written with John Norberg, was released. "Spacewalker: My Journey in Space and Faith as NASA's Record-Setting Frequent Flyer", provides an unvarnished account of Ross' successful quest to become an astronaut and the curious, inspirational, alarming, and amusing encounters he experienced along the way. Space Safety Magazine sat down with Ross to discuss some of those anecdotes and their implications.

> "I stuck around for a long time"

The Importance of Experience

We asked Ross what exceptional quality he possessed that allowed him to fly seven flights, the first to break John Young's record six flights. After all, at the peak of the Shuttle program there were hundreds of astronauts and astronaut candidates waiting for their turns, and Ross' EVA specialty was a popular one. He described the advantages of his athleticism and passion, saying that wearing a spacesuit felt second nature to him. But he also got in on the ground floor and, as he says, "I stuck around for a long time." Many astronauts didn't: satisfied with one or two flights or discouraged by accidents and long down times, they left for other pursuits.

One of the advantages of Ross' three decades of experience is that he can spot hardware and EVA problems before they happen. He can reach back into his personal history to say: we tried that, it didn't work. He has many examples of when that expertise prevented significant, even disastrous, mistakes from occurring on orbit. He recounts at the beginning of the International Space Station (ISS) program, managers decided not to perform thermal vacuum testing on any components. "We advocated very strongly that that was not the right thing," Ross recalls for us. The program gave him just enough money to perform three vacuum chamber tests. "One of the very first pieces of station hardware that I identified to test was the ammonia connector, the fluid QDs that we used to hook up the ammonia lines all around the exterior of the station," he says. He suited up and attempted to throw a handle to close a valve while in the vacuum chamber under conditions simulating the extreme cold of space. The handle wouldn't move. "The hardware provider engineers were sitting there in the control room outside," Ross relates. "They said 'Oh it'll move, just push the handle a little bit harder.' I said 'I'm push- ▸▸



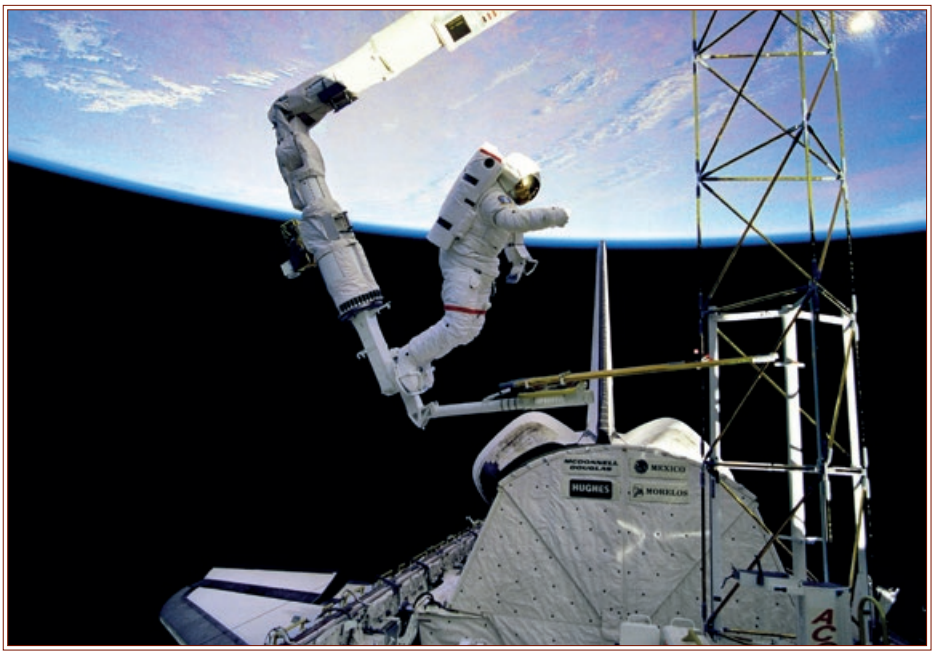
On the left, Ross' original astronaut portrait from 1981. On the right, his final astronaut portrait from 2002, featuring his seven mission patches. – Credits: NASA

> “Had we not tested that on the ground, we may have lost the station because of that”

ing pretty hard now, you sure you want me to push harder?’ And he said ‘Yeah push harder.’ So I pushed a little harder and actually bent the handle. Had we not tested that on the ground, we would’ve got on orbit and would have had a real bad case on our hands. We would have had to completely rebuild fluid lines; we may have lost the station because of that.”

Another time, Ross learned that the ISS program was not planning to perform integrated fit checks on the ground before launching ISS segments into orbit. “All they were going to do was to validate that the Interface Configuration Documents (ICD) were compatible. And I said ‘Guys, we’ve done this before throughout the Shuttle program. We’ve done fit checks, and we found a lot of problems.’” Ross went back to the Astronaut EVA office where he served as chief and had his staff search the records. “In less than half a day they came back with three or four great examples of where the paperwork didn’t get things right.” Program managers gave in, and Ross got his ground testing, where numerous problems were identified and corrected. He’s proud that the work he did made sure ISS construction proceeded smoothly, with no major EVA hiccoughs.

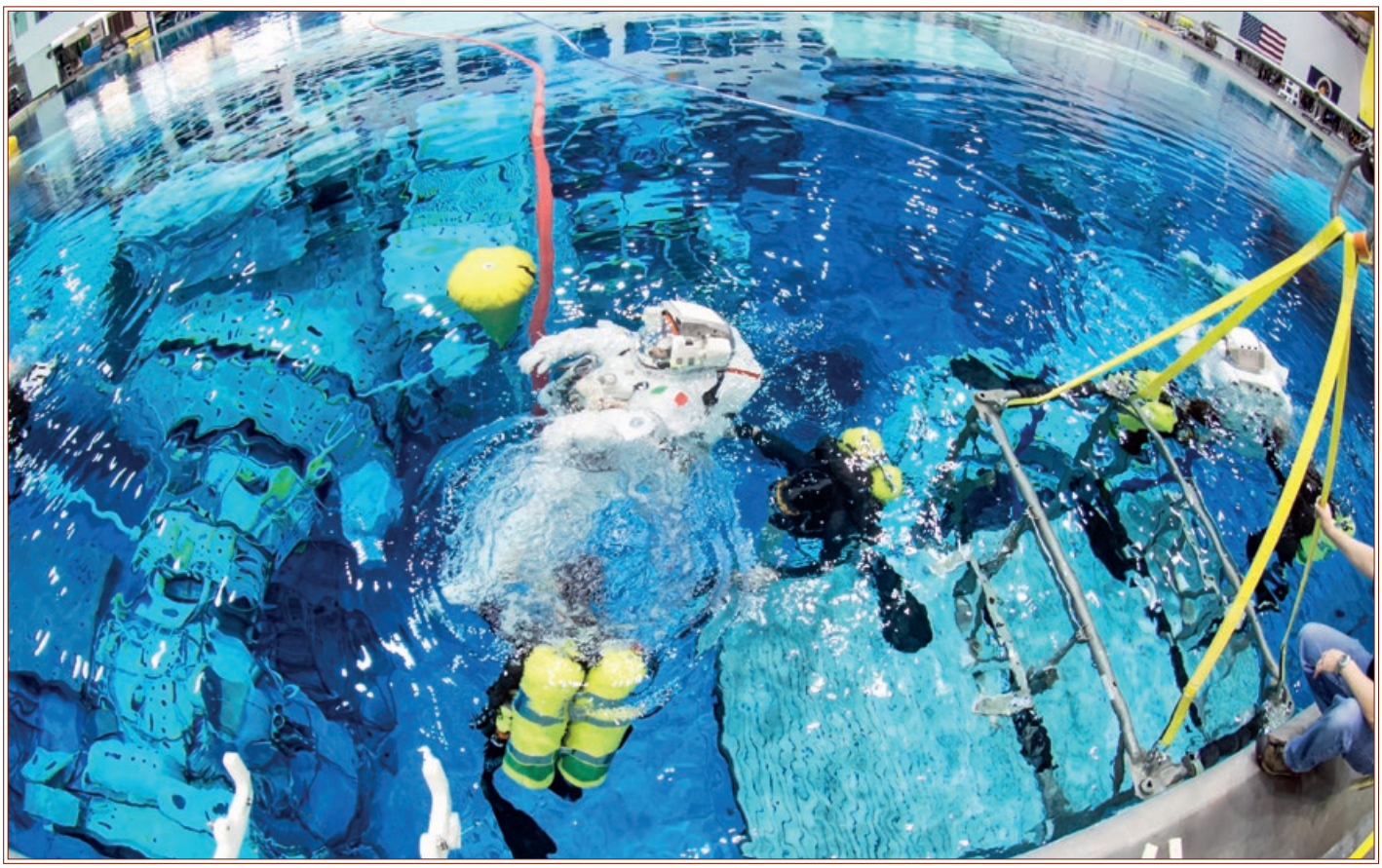
For Ross, pictured here during STS-37, it was all about the EVA. – Credits: NASA



Astronaut Jerry L. Ross, anchored to the foot restraint on the remote manipulator system, approaches the Assembly Concept for Construction of Erectable Space Structures (ACCESS) device during STS-61B. – Credits: NASA

The Role of Advocacy in NASA

Most of the things we had to go back to the station program and urge them to do, the managers really knew that they should be doing it; but they were being forced by schedule and especially by cost to try to do things in a streamlined fashion,” Ross explains. “We had to go back and demonstrate to them that there were reasons that we did this in the past and help kind of jog their conscience and help them to make the right decisions.” In “Spacewalker," he writes about how his advocacy green lighted development of Simplified Aid for EVA Rescue (SAFER), an upgrade to the retired Manned Maneuvering Units (MMU). SAFER was designed to allow an adrift astronaut to propel himself back to the ship. During the Shuttle years, self-rescue was a low priority; after all, the Shuttle could always fly over and pick up a drifting astronaut. Not so with ISS. Ross’ request for SAFER development was initially turned down, until he asked what the program manager would tell an astronaut’s spouse when said astronaut was drifting off with low oxygen and failing battery. “It was the right answer and it still is the right answer,” Ross says now.



Astronauts train in the Neutral Buoyancy Laboratory, which was built due to Ross' advocacy. – Credits: NASA

"In fact, I understand that they are in the process of building a follow up unit because the ones that are up there now are running out of their mission lifetime."

Without advocacy, many safety-related needs just never get addressed. Every NASA program must compete for the same pile of time, money, and attention. "We did that throughout the entire career of the Shuttle and station," says Ross. "That was one of my biggest roles as a crewmember, identifying the hardware that was needed and the capabilities that were needed; forming a consensus within the EVA community; and using that leverage to go advocate for and hopefully secure the capability we needed."

With the retirement of the Shuttle program and associated layoffs, and the earlier exodus upon termination of the Constellation program, expertise in some tasks is getting scarce at NASA. "We also lost a lot of early and midyear people from the agency because they have been frustrated with the lack of definition of what we're going to be doing in the future," says Ross. "That is a severe loss to the agency."

Absence of that expertise is already showing. We asked about the August 30, 2012 spacewalk by astronauts Sunni Williams and Aki Hoshide during which a bolt got stuck during replacement of a power unit. "I think it was an error, or a loss of knowledge that caused them to not do that task properly the first time," Ross says. They should have driven one bolt out completely before backing out the second bolt, he explains. "The first one to back out is like a locking bolt to securely hold the box in place. The other bolt is the one that is longer and actually drives the electrical connectors on the back of the box into the receptacles on the station structure. That is how the hardware was designed to be operated." (Editor's note: Space Safety Magazine asked NASA's Johnson Space Center to confirm this explanation; they did not respond.)

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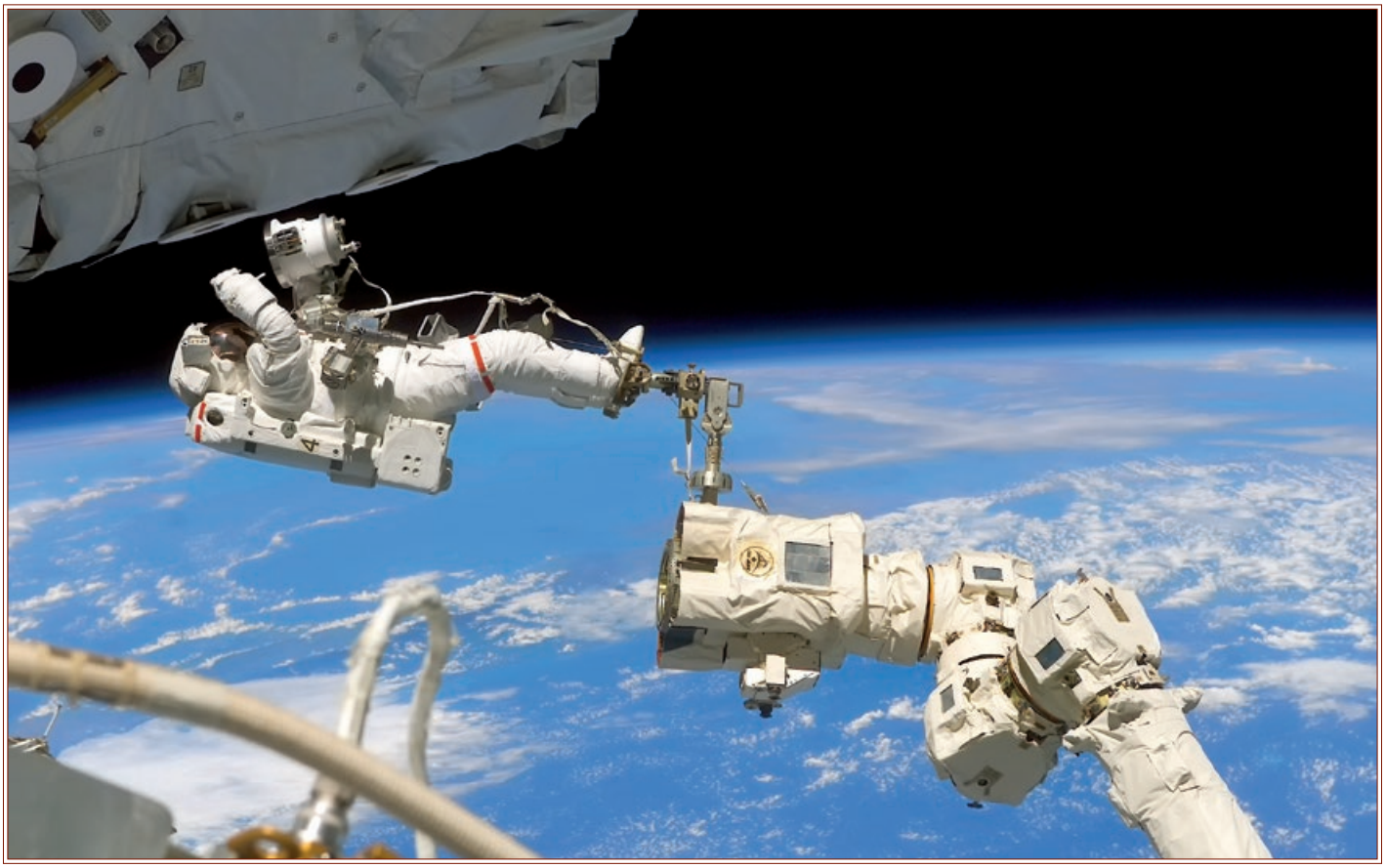
Routine and Risk

There are other incidents that Ross recounts in his book that ring alarm bells for the safety minded. There was the time on EVA in STS-88 when communications were interrupted by a sports broadcast using an illegal frequency, causing Ross and fellow spacewalker Jim Newman to halt work until they passed the signal's range. Or the time on STS-27 when the Shuttle launched with a small leak in one of its tires and the crew kept the bottom of the orbiter oriented towards the Sun during flight to keep the pressure up. And after STS-27 when inspection showed the spot where a lucky doubled layer of metal was all that kept the orbiter from a complete burn through: over seven hundred thermal protection tiles had been damaged and one was missing.

Ross recounts in Spacewalker that after the loss of the Space Shuttle Challenger on January 28, 1986, "all of us in the Astronaut Office were shocked, disappointed, and mad." Ross himself still feels that officials at NASA's ▸▸



Ross, building ISS on his final EVA, STS-110. – Credits: NASA

> "I had no problem talking to anyone at NASA if I thought there was something wrong"

Marshall Space Center should have been held legally accountable. "After the accident, they were still doing things to try to conceal or cover up what had happened," Ross says. "That's why I thought they should have been held criminally liable for what they'd done." He was also upset that there had been people who were aware of the O-ring problem, but no one bothered to tell the astronauts. "Had we been more knowledgeable on that we would have focused a lot more attention on that and would have been much more critically involved in the review process."

Columbia was different; when STS-107 was lost during reentry on February 1, 2003, the Astronaut Office was well aware that foam was coming off the External Tank on pretty much every flight. "I think that we were subject to the same thing many of the managers were," Ross tells us, "that the hardware survived some dings from foam coming off, so therefore I guess we all kind of started to feel that the thermal protection systems were a little bit more robust than what we originally thought. There was plenty of blame to be shared by almost everybody in the agency on that one."

Post-Flight

Ross' last flight was STS-110 in 2002. After Columbia, he knew he'd never fly again. But he stayed at NASA anyway, hoping to make it safer for his friends to fly. "I had no problem talking to anyone at NASA if I thought there was something wrong," he wrote in "Spacewalker." "What were they going to do if they didn't like what I had to say? Tell me I couldn't fly anymore?" He served in the newly formed NASA Engineering Safety Center (NESC) as Chief Astronaut during that time.

Ross recalls feeling relieved when Atlantis flew its last in July 2011. "As sad as I was to see that, it was time for the program to end," he wrote. In addition to the need for a vessel that could explore beyond low Earth orbit, Ross says he had a nagging feeling in the pit of his stomach every flight after Columbia, asking himself if there was some hazard they had missed. "On nearly every mission we found additional issues about which we were concerned. If the Shuttle had continued to fly, statistically it would have been just a matter of time until we lost another vehicle and another crew."

Ross doesn't want to see the end of human spaceflight: he just wants it to be safer, and faster. He doesn't understand why NASA is funding four different spacecraft – three commercial vessels along with Orion – instead of focusing on just one, and getting it completed. "There're so many unknowns at this point, it's frustrating," says Ross, both for the folks still at NASA and those watching – and looking for something to cheer on – from home.