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Chapter 9: AIM TO BE A ZERO

A FRIEND OF MINE was once in a crowded elevator in Building Four South at JSC in Houston when a senior astronaut got on and just stood there, visibly impatient, waiting for someone to divine that he needed to go to the sixth floor, and push the button. "I didn't spend all those years in university to wind up pushing buttons in an elevator," he snapped. Incredibly enough, someone did it for him. This incident made such a big impression on my friend that I heard about it, and probably a lot of other people did, too. For me, it was a cautionary tale about the pitfalls of ever thinking of yourself as An Astronaut (or A Doctor, or A Whatever). To everyone else, you're just that arrogant guy on the elevator, craving significance.

Over the years, I've realized that in any new situation, whether it involves an elevator or a rocket ship, you will almost certainly be viewed in one of three ways. As a minus one: actively harmful, someone who creates problems. Or as a zero: your impact is neutral and doesn't tip the balance one way or the other. Or you'll be seen as a plus one: someone who actively adds value. Everyone wants to be a plus one, of course. But proclaiming your plus-oneness at the outset almost guarantees you'll be perceived as a minus one, regardless of the skills you bring to the table or how you actually perform. This might seem self-evident, but it can't be, because so many people do it.

During the final selection round for each new class of NASA astronauts, for example, there's always at least one individual who's hell-bent on advertising him- or herself as a plus one. In fact, all the applicants who make it to the final 100 and are invited to come to Houston for a week have impressive qualifications and really are plus ones—in their own fields. But invariably, someone decides to take it a little further and behave like An Astronaut, one who already knows just about everything there is to know— the meaning of every acronym, the purpose of every valve on a spacesuit—and who just might be willing, if asked nicely, to go to Mars tomorrow. Sometimes the motivation is over-eagerness rather than arrogance, but the effect is the same.

The truth is that many applicants don't have any realistic idea of what it means to be an astronaut. How could they? In the movies, astronauts are not toiling over Russian vocabulary work sheets. They're superheroes. Even the most level-headed among us have been influenced to some degree by that image. I know I was. So one purpose of that week at JSC is to dispel any comic-book notions about what working for NASA is really like. And some people do take a look around and run for the hills.

Those who aren't scared off are, in between familiarization sessions and tours, put through their paces. We give them an intelligence test and an aptitude test for manipulating robotic equipment such as Canadarm2, which requires the ability to visualize in 3-D (it's quite tricky). We even suspend applicants in simulated zero gravity to get a sense of their hand-eye coordination. Other assessments, like figuring out who plays well with others, are less formal. Applicants certainly know during the social mixer with astronauts from the office that we are evaluating them as potential crewmates, but they probably don't know who else has input. One Chief Astronaut used to make a point of phoning the front desk at the clinic where applicants are sent for medical testing, to find out which ones treated the staff well and which ones stood out in a bad way. The nurses and clinic staff have seen a whole lot of astronauts over the years, and they know what the wrong stuff looks like. A person with a superiority complex might unwittingly, right there in the waiting room, quash his or her chances of ever going to space.

Which is a good thing, really, because anyone who views him- or herself as more important than the ''little people" is not cut out for this job (and would probably hate doing it). No astronaut, no matter how brilliant or brave, is a solo act. Our expertise is the result of the training provided by thousands of experts around the world, and the support provided by thousands of technicians in five different space agencies. Our safety depends on many tens of thousands of people we'll never meet, like the welders in Russia who assemble the Soyuz, and the

North American textile workers who fabricate our spacesuits. And our employment depends entirely on millions of other people believing in the importance of space exploration and being willing to underwrite it with their tax dollars. We work on behalf of everyone in our country, not just a select few, so we should behave the same way whether we're meeting with a head of state or a seventh-grade science class. Frankly, this makes good sense even if you're not an astronaut. You never really know who will have a say in where you wind up. It could be the CEO. But it might well be the receptionist.

If you enter a new environment intent on exploding out of the gate, you risk wreaking havoc instead. I learned this the hard way in graduate school, when we were in the lab designing low-pressure fuel pumps. We tracked our progress using different dyes, and at the end of the first day, we had an array of jars filled with leftover dye. I very efficiently took charge and poured them all down the drain in the corner of the room. Why bother asking questions? I already knew what needed to be done. Well, as it turned out, that particular drain was actually part of the lab's data collection system and therefore had to be kept spotless. The professor who ran the place couldn't believe I'd dumped dye all over it. Now the whole system had to be purged and purified, which meant a lot of extra work for him and other people. I'm sure that if he connected the dots today, he'd say, *"That* guy became an astronaut? But he's an idiot!"

When you have some skills but don't fully understand your environment, there is no way you can be a plus one. At best, you can be a zero. But a zero isn't a bad thing to be. You're competent enough not to create problems or make more work for everyone else. And you have to be competent, and prove to others that you are, before you can be extraordinary. There are no shortcuts, unfortunately.

Even later, when you do understand the environment and can make an outstanding contribution, there's considerable wisdom in practicing humility. If you really are a plus one, people will notice—and they're even more likely to give you credit for it if you're not trying to rub their noses in your greatness. On my second National Outdoor Leadership School survival course I shared a tent with Tom Marshburn, my crewmale on Expedition 34/35. Tom is the ultimate outdoorsman: a vastly experienced mountaineer, he's summited on several continents and also walked the Pacific Trail—alone—from Canada to Mexico, covering more than a marathon's distance each day. And yet during our course in Utah, he never imposed his expertise on anyone or told us what to do. Instead, he was just quietly competent and helpful. If I needed him, he was there in an instant, but he never elbowed me out of the way to demonstrate his superior skills or made me feel small for not knowing how to do something. Everyone on our team knew that Tom was a plus one. He didn't have to tell us.

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So how do you get to be a plus one, someone who adds value? I wasn't certain when I was training for mission STS-74 in 1995, so as I mentioned earlier, I watched Jerry Ross, the most experienced astronaut on our crew, to see how he did things. After a while, I noticed that he was regularly coming into the office an hour early and quietly plowing through our commander's inbox, taking care of all the administrative details himself so the commander could focus on the important matters. I'm sure Jerry wasn't asked to do this, and he never mentioned it, let alone expected any recognition for it. He was voluntarily pushing the elevator buttons for someone else, so to speak, without fanfare or resentment. It was classic expeditionary behavior, putting the needs of the group first.

It was also a big part of what made him a plus one on our crew. Not only did he bring a wealth of experience and knowledge, but he conducted himself as though no task was beneath him. He acted as though he considered himself a zero: reasonably competent but no better than anyone else.

That made a lasting impression on me. Especially when I'm entering a new situation and don't yet have the lay of the land, I think about how to aim to be a zero and try to contribute in small ways without creating disruptions. Approaching the ISS in December 2012, our crew talked about how to do this. Leaving Earth, we'd been treated like conquering heroes. But when we opened the hatch and floated into the ISS, we'd just be the new guys, the ones who didn't know where anything was. We'd be joining a crew of three people who'd been working and living on the ISS for months; they'd have developed their own

shorthand for communicating, their own ways of doing things, their own routines. They'd probably be happy to see us—fresh supplies! — but also a little wary. What if we put trash in the wrong place or inadvertently ate the last pouch of peach ambrosia that someone had been saving for a treat?

We could also create bigger problems. When you first come into the Station after a few days of confinement in a Soyuz, you're disoriented and clumsy (not least because you're probably pretty anxious to get to a more-or-less private bathroom). It's like being a baby bird and not quite knowing how to fly yet. You might float past what just looks like a bunch of junk on the wall but is actually a biological experiment—bump it accidentally and years of science (and someone's life work) might be destroyed. This actually happened during my second mission: someone on our crew brushed up against an experiment as we entered the ISS, wiping out a whole month's worth of data.

The ideal entry is not to sail in and make your presence known immediately. It's to ingress without causing a ripple. The best way to contribute to a brand-new environment is not by trying to prove what a wonderful addition you are. It's by trying to have a neutral impact, to observe and learn from those who are already there, and to pitch in with the grunt work wherever possible.

One benefit of aiming to be a zero: it's an attainable goal. Plus, it's often a good way to get to plus one. If you're really observing and trying to learn rather than seeking to impress, you may actually get the chance to do something useful. For instance, before I'd ever flown in space, I was in a Shuttle entry sim with two very experienced astronauts. I was in student mode, keeping my eyes open and my mouth shut, when the commander reached up to turn something on. Because I was watching so closely, I knew without a doubt that he was about to press the wrong button. So I said, "Wait, that's not the right one." No big deal. He readjusted, the sim went on and I didn't say anything else about it nor did anyone else. A few months later, though, we happened to be at the Cape together for a launch, talking to the head of JSC, when with no prompting or warning, the commander began extolling my powers of observation for having caught this error in the sim. I got assigned to my first mission shortly thereafter. There may not be a connection, but one thing is certain: aiming to be a zero didn't hurt my chances.

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Approaching a space station, you turn your mind to the technicalities of rendezvous and docking. It's not like parking a car. It isn't intuitive, because orbital mechanics aren't like anything on Earth. When you throw a ball or roll it down a hill, you can predict with fair accuracy where it will go, and how its trajectory would change if you threw harder or softer. But in space, you have to go faster to reach a higher orbit—and once you get there, you actually go slower. So in order to maneuver to link up with another orbiting vehicle, you have to think in a whole new way about how objects behave. Yes, you've got all kinds of sensors and lasers to help you gauge distance and angles, but first you have to understand what they're telling you—and *not* telling you —and how to use them.

My first space flight, in 1995, was all about rendezvous and clocking, since the purpose of our mission was to add a permanent clocking module to Mir so the Shuttle could go back and forth regularly. Just a few years earlier. I'd been intercepting Soviet bombers for NORAD, but now I was part of a mission aiming to help create a closer relationship between the United States and Russia. When the U.S.S.R. dissolved in 1991, its space program was in danger of dissolving, too, as government funding evaporated. The U.S. didn't want Russian military technology being sold off to or shared with politically unstable countries, so NASA did what it could to shore up Roscosmos, its Russian counterpart, by providing funding for cooperative ventures such as regular visits to Mir. Of course, there was something in it for NASA: learning from the people who had the most experience building and maintaining space stations, and in the process creating a partnership that is absolutely vital today. Now that the Shuttle is not in service, we couldn't get up to the ISS without the Russians. Ultimately, it was a very smart move for both countries to figure out how to work together on space exploration.

But in November 1995, the linkage of the two space programs was still a work in progress. The Shuttle had managed to clock with Mir only once before, earlier that year, and that had involved reassembling an entire module of the space station in order to jerry-rig a spot. It was not a viable or safe option going forward. Which is where we came in: our job was to build a permanent dock. The docking module—which looked a lot like a giant version of a propane container you might hook up to your barbecue, only orange — had been assembled on Earth and then placed in *Atlantis's* payload bay. Once we were

in space, we had to attach the module securely to the top of our craft, then ease on up to Mir and connect. Which we really, really hoped would work, given that it had never been tried before. Since the Shuttle flew rather awkwardly at best, docking promised to be a form of elephantine ballet.

My role in all this was to operate the Canadarm, the Shuttle's robotic arm and the crown jewel of the Canadian Space Agency. I knew it was a national treasure, but to me it was a tool, like a hammer or a farm implement. I would use it to reach into the payload bay, carefully haul the docking module out into space, rotate the module to a vertical position, and maneuver it to within a few inches of our docking mechanism. In order to get them to connect, we then had to fire all the Shuttle's maneuvering thrusters and slam into the docking module, like two trains coupling. If we did it correctly, hooks and latches would engage to form a solid, airtight seal. If not, well...

I'd been practicing robotically lifting, turning and manipulating large objects for a full year beforehand on Earth, but of course we were worried — really worried — that plan A might not work. So we had a few backup plans. If firing the Shuttle thrusters to drive us up into the docking module didn't work, we'd try to slam the module down into place using the Canadarm. Since the arm is like a large pair of forceps, designed for positioning things, not for ramming them, there was a chance it might break if we tried this, in which case the 5-ton module would float off serenely into outer space.

Helping to lose a docking module on my first space flight would put me well below' minus one, so I really wanted plan A to work. Thankfully, it did. By the end of the second day of our mission, we had what looked like a huge tower sticking out of the top of the Shuttle. Now we had to dock with Mir, which looked like a thick pole with spokes radiating out of it. One drawback of our new 15-foot tower of a docking module is that it blocked any view of where we needed to ease in, exactly. On Earth we'd rigged up a simulator to practice, of course, and had figured out that the camera on the elbow of the robotic arm would be the same height as the place where we'd need to link with Mir. Yes, the angle would be weird, but at least it would give us a visual.

As it happened, that one camera turned out to be crucial, because when the time came to dock, all of our distance sensors malfunctioned. Every single one. They were lying to us, basically, giving us the wrong information about range and speed, so we had no choice but to try to dock by eyeballing it, via the camera view. Fortunately, we had a good idea how to do that, because our instructors had insisted that we memorize every sensor reading from rendezvous to docking, which seemed ridiculously theoretical at the time but meant that we did have a good idea of how to do this manually.

Nevertheless, as you might imagine, there were some very tense minutes while Ken Cameron, our commander, *got Atlantis* into position. If we came in too tentatively, we'd bounce off and have to wait 24 hours to try again, because we needed to attempt docking while we were over Russia, so that the crew on the station could communicate with Mission Control in Korolev (Mir did not have continuous communication with the ground). During that 24 hours, we'd be using up fuel and running the risk of something else breaking, plus we'd still be facing the same problem when we tried again—at which point we'd also be risking total mission failure. However, if we came in too fast and too aggressively, we might collide with the station and cause it to depressurize, in which case everyone inside would be dead in a matter of minutes.

Ken opted not to over-control or under-control. He aimed to be a zero, just relied on his training and wisely didn't try to add any flourishes now that we had a giant barnacle clinging to the top of our vehicle. It worked. We wound up linking up with the docking module just three seconds early. Perhaps you can imagine our sense of relief and anticipation when the moment finally came to open the hatch and enter Mir. Cue triumphant *Chariots of Fire*-type theme music, appropriate to an historic moment of international cooperation.

Only, we couldn't get the hatch open. On the other side, they were kicking it with all their might. But the Russian engineers had taped, strapped and sealed our docking module's hatch just a little too enthusiastically, with multiple layers. So we did the true space-age thing: we broke into Mir using a Swiss Army knife. Never leave the planet without one.

As we floated into the station to greet the waiting crew— Russians consider it unlucky to shake hands across the threshold, and wanted us to wait until we were all the way inside—there was a magical, faint tinkling of bells and chimes. It took me a moment to figure out that this was actually the gentle clanging of old experiments that had been tethered to the sides of the metal spaceship, awaiting disposal or return to Earth.

While we were still in transit we'd resolved to be good house-guests: to help out with the chores, not get in the way, and bring gifts (including a specially made collapsible guitar, called a SoloEtte, which I got to play one evening in a two-crew, three-nation sing-along). The not-getting-in-the-way part turned out to be the most difficult. The station was so cluttered that navigation required extra care; to get from one section to another, we had to pull ourselves through narrow, circuitous tubes that were like flexible ventilation ducts. It was a strange feeling, like being inside the intestines of a giant but not unfriendly robot, and in our few days there I learned to do it quickly, so I'd pop out the other side and the rush of air would set the experiments to chime-like tinkling again.

When we gol back to Earth, a lot of people asked whether everything had gone the way we'd planned. The truth is that nothing went as we'd planned, but everything was within the scope of what we prepared for. That was one of the fundamental lessons of STS-74: don't assume you know everything, and try to be ready for anything. The other lesson, for me anyway, was that when you're a rookie, aiming to be a zero is a good game plan. My goals had been modest — fulfill my responsibilities to the best of my ability, and not distract or cause any trouble for anyone else on the crew — and I'd achieved them.

When you're the least experienced person in the room, it's not the time to show off. You don't yet know what you don't know — and regardless of your abilities, your experience and your level of authority, there will definitely be something you don't know.

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In 2001, shortly after we docked on my second mission —which was my first visit to the ISS—the main computers that ran the ISS failed. All had an inherent flaw and started overwriting their own hard drives. This meant that for all intents and purposes, the Station was dead: it couldn't control its attitude, point its antennae, run its own diagnostics—all kinds of capabilities were gone, and the ground could barely communicate with us. If we hadn't had the Shuttle docked and ready to control the entire combined structure, we would have been in serious trouble. Fortunately, we could use the Shuttle's communications and thruster systems, and we still had oxygen, food and water, so the crew's attitude was just to keep working the problem.

However, because the computers were down, most of the things we'd been scheduled to do were no longer feasible and we wound up with a day when we were at loose ends, My crewmate Scott Parazynski and I were both rookies on Station and given our limited skill set, there wasn't a whole lot we could do to help solve the computer problem. So we went to Yuri Usachev, the commander at the time, and asked, "What's the most useful thing we could be doing right now?" He said he'd really appreciate an inventory of the inside of every single locker in the Russian cargo block. It's a pretty big module lined with cupboards, so we just started at one end and went through every single one, cataloguing all the stuff that was in there. It was a lot like organizing your closets: useful but time-consuming and glory-free. It took us a few hours and was clearly the kind of task two crew members would never have been able to fit into the schedule if the ISS had been fully operational. We joked around and tried to make it fun while we were doing it, and when we finished, we felt celebratory. We'd managed to add a bit of value on a day when otherwise we wouldn't have accomplished much at all.

Later on that same flight, after the computer problems had been fixed, I had a similar sort of opportunity. We'd set up a video camera for a media event, but the video feed wasn't making it back to the ground. Someone was going to have to start at one end, untangle all the cables, and test each one. I thought, "Might as well be me." Sure enough, it turned out that although we'd checked them before launch, two out of the three cables were bad, so I scrambled around for others, cobbled something together, threw the switch and got the video up and running. It seems trivial maybe, being the cable guy, but I felt good that I'd worked the problem so we could deliver what we'd promised.

In a way, it feels wrong even mentioning it—I didn't, at the time—because I know everyone else on board did similarly unheralded, unobtrusively helpful things. We've all fixed the toilet in space (it breaks down regularly). We've all wiped jam off the walls (it has a way of floating off your toast and splattering everywhere). On the ISS you have to he ready, willing and eager

to do every job, from the highest-visibility stuff right down to rewiring an antenna, because there's nobody else to do it.

But if you are confident in your abilities and sense of self, it's not nearly as important to you whether you're steering the ship or pulling on an oar. Your ego isn't threatened because you've been asked to clean out a closet or unpack someone else's socks. In fact, you might actually enjoy doing it if you believe that everything you're doing contributes to the mission in some way.

Still, I'm human. I like recognition and I like feeling that others consider me a plus one. Which is why, as we approached the ISS on December 21, 2012, I consciously reminded myself to aim to be a zero once we got inside. Back home, it was a big deal that I was going to be the first Canadian commander of the ISS. Up here, there already was someone in charge: Kevin Ford, who would continue as commander until he left 10 weeks later and handed over to me. He and his crew were completely acclimated and had been successfully running the ISS for several weeks by the time we showed up.

My smartest strategy was simply to try not to mess anything up or make things worse. I was sure that once in a while, I'd be able to do something good and make an authoritative decision, but it didn't need to happen in the first hour or even the first week. If I barged in, intent on making my mark, I probably would —just not in the way I wanted.

Two decades into my career as an astronaut, I felt as close to being a plus one as I ever had. And I knew that my best bet of getting the crew to see me that way was to keep on doing what has always worked for me: aiming to be a zero.