Monday, Aug. 26, 2024 / Stuck in space

[HALF SECOND OF SILENCE]

[BILLBOARD]

SEAN RAMESWARAM (host): There’s something like 8 billion, 172 million, 816 thousand, 333 humans on planet Earth right now. And there are exactly two humans stuck in space.

<SCORING IN> Dave The Mage - Entities - BMC

SEAN: Now, to be clear NASA wouldn’t say they’re stuck. NASA would say they’re on a test flight. And test flights are unpredictable.

*<*[*CLIP*](https://www.youtube.com/watch?v=AGOswKRSsHc)*> BILL NELSON, NASA ADMINISTRATOR: A test flight by nature is neither safe nor routine.*

SEAN: But these two American astronauts, Butch Wilmore and Suni Williams, were set to go up to space on a Boeing spacecraft for an eight day trip. And over the weekend we just found out they’re probably not coming back until SpaceX gives them a ride in February.

*<*[*CLIP*](https://www.youtube.com/watch?v=YNJPUNMsPjE)*> CBS NEWS: A lot of this has called into question the future of Boeing and their ability to continue to send NASA astronauts up into space.*

SEAN: What happened and what it’s like to be stuck in space, coming on *Today, Explained*.

[THEME]

*<BUMPER> SPACE\_Fly Me to the Moon*

LOREN GRUSH (space reporter at Bloomberg): My name is Loren Grush and I am the space reporter at *Bloomberg*.

SEAN: So people have heard probably about these two astronauts stuck in space. But before we get into the story, can you tell us what two astronauts stuck in space tell us about life here on Earth?

LOREN: My ongoing refrain is that aren't we all technically stuck in space at any given moment?

SEAN: HA! [laughs]

LOREN: I mean, I can't get off this Earth if I wanted to. So I guess I'm stuck here, technically.

SEAN: Good for them.

LOREN: [laughs]

SEAN: So where does this story start?

LOREN: I mean, I guess if we really want to go all the way back, we can start back in 2014, when NASA gave the contracts to Boeing and to SpaceX to create these vehicles to send astronauts to and from the International Space Station.

SCORING IN <Space - APM>

*<*[*CLIP*](https://www.youtube.com/watch?v=FSSyzXvY6S4)*> CHARLES BOLDEN, NASA ADMINISTRATOR: We're handing off to the private sector our transportation to the International Space Station, so that NASA can focus on what we do best, exploring even deeper into our solar system …*

LOREN: It's called the Commercial Crew Program. And the idea behind it was to come up with American-made vehicles that could transport NASA's astronauts to and from the International Space Station after the space shuttle program was canceled and ended in 2011.

*<*[*CLIP*](https://www.youtube.com/watch?v=U09KSe6aCfY&t=321s)*> PHILIP MCALISTER, ACTING DIRECTOR, NASA COMMERCIAL SPACE FLIGHT DEVELOPMENT: While we are ending the space shuttle program, we are not ending the nation's human space flight program. It is evolving into an exciting new paradigm of commercial crew operations to low earth orbit.*

LOREN: And the idea behind that was then that Boeing and SpaceX could then take their vehicles and use them for non-NASA purposes. So when these contracts did go out there was a lot of friction about even including SpaceX as one of the winners, just because at the time they were still a relatively unproven entity. They had already become a partner for NASA and had launched supplies to the International Space Station, but they were still kind of on their rise, if you will, and so they weren't widely trusted. Whereas Boeing was a longtime NASA contractor. So they were kind of, what was thought of as a known entity. You know, it was definitely a bit of a David and Goliath dynamic.

*<*[*CLIP*](https://www.goodmorningamerica.com/news/video/nasa-boeing-spacex-contract-return-manned-spaceflight-flights-25548866)*> MICHELLE FRANZEN, ABC NEWS: Boeing and SpaceX sharing a nearly seven billion dollar contract for flights to the International Space Station.*

LOREN: NASA gave 2.6 billion dollars initially to SpaceX and 4.2 billion to Boeing. So it was kind of a lopsided dynamic to begin with. And the prevailing idea was that Boeing would eventually be the one to beat in this scenario.

SCORING OUT

SEAN: So this cold space race sorta starts ten years ago. How does it shake out in the intervening ten years before we get to this mission that we're here to talk about today?

LOREN: As things have been developing, the road to getting to space has been a lot bumpier for Boeing than it was for SpaceX. Now, SpaceX did have its trials and tribulations getting to the launch pad. But for Boeing, the Starliner program seems to have been particularly snake bitten.

SEAN: Hm!

LOREN: In 2019, they launched an uncrewed version of the vehicle. They suffered multiple software glitches, one of which ultimately prevented them from reaching the International Space Station. And so they had to bring the vehicle home earlier than planned and ultimately perform a do over of that mission.

*<*[*CLIP*](https://www.youtube.com/watch?v=X3H8kabAtOU)*> JIM BRIDENSTINE, NASA ADMINISTRATOR: The spacecraft tried to maintain a very precise control that it normally wouldn't have tried to maintain and it burned a lot of prop in that part of the flight. And when that prop got burnt it looked like we weren't going to be able to go ahead and rendezvous with the International Space Station.*

LOREN: That second flight that they did was delayed by roughly a year, and that was because they discovered a series of corroded valves within Starliner that prevented them from launching.

*<*[*CLIP*](https://www.youtube.com/watch?v=wH-ua03NUEI)*> FAITH ABUBÉY, ABC NEWS: This was supposed to be the first test mission with humans on board to the International Space Station and it comes after years of delays and technical setbacks for Boeing.*

LOREN: And so whereas SpaceX ultimately launched people on their Crew Dragon in 2020, here we are four years later, finally launching people on Starliner and having these major issues.

SEAN: And I, I, I believe the major issues that we're talking about is that there are two people in space who can't get back, at least for now. So tell us how we got there.

LOREN: Yeah. So. At long last, it did feel as if we were finally ready to launch people on Starliner in May of this year, and we got all the way up to a potential launch. And then it was pushed back, which is not unheard of in the launch industry. But then after they had rolled the vehicle back, they looked at Starliner a little more closely and determined that it had a helium leak. And ultimately, NASA determined that they didn't quite know the source of the leak or why it was leaking, but ultimately it seemed fine and they were okay to launch. And so, knowing that there was a leak, they wound up launching successfully on June 5th with Butch and Suni on board.

SCORING IN <White Spiders remix - BMC>

*<*[*CLIP*](https://www.youtube.com/watch?v=VSp5bcV0SVI)*> NASA ANNOUNCER: 5, 4, 3, 2, 1, ignition and liftoff of Starliner in Atlas 5 carrying two American heroes, drawing a line to the stars for all of us.*

LOREN: Then, as they were in space and approaching the International Space Station for docking, we start hearing that there's actually another leak and another leak.

*<*[*CLIP*](https://www.facebook.com/watch/?v=320198001142723)*> CBS NEWS: Just hours after Starliner’s June 5th launch came the first sign of trouble.*

*GROUND CONTROL: Starliner, looks like we picked up a couple more helium leaks.*

*BUTCH WILMORE: All right, we’re ready to copy and find out exactly what you mean by ‘picked up another helium leak.*

LOREN: Then even more concerning, as they're approaching the ISS, we hear that a number of thrusters have failed. And so thrusters are these tiny engines that the Starliner spacecraft uses to maneuver through space. They're obviously really critical when it comes to maneuvering up to the International Space Station. You know, you have to remember, these vehicles are moving through orbit at roughly 17,500 miles per hour. So being able to approach very delicately is key.

*<*[*CLIP*](https://www.youtube.com/watch?v=MIFA3EONVmg)*> FOX 35 ORLANDO: In total, they lost five thrusters while they were trying to dock. The crews were able to fix four of the thrusters, but one is still faulty and they're running tests on it.*

LOREN: Thankfully, Starliner was able to dock just fine and bring the astronauts on board. Still, though, we had plenty of questions as to what had happened.

SEAN: And the reason those astronauts are stuck on the International Space Station is because we still don't have the answers to those questions?

LOREN: Basically.

SCORING OUT

LOREN: So ever since they got there, NASA and Boeing have been doing data analysis, research, trying to get to the heart of why the thrusters failed. And while they ultimately came to some conclusions – they suspect that there was some overheating of some Teflon in the system – there isn't, you know, total consensus within NASA about the origin of the thruster problem. And so because there is disagreement within NASA, that is when they've decided, okay, we might need to invoke a contingency plan.

*<*[*CLIP*](https://www.youtube.com/watch?v=PAIZHhrGqBM)*> STEVE STICH, PROGRAM MANAGER FOR NASA'S COMMERCIAL CREW PROGRAM: We have a nice opportunity to almost, like, use the International Space Station as a temporary hanger to take our time and understand the spacecraft before we undock and return.*

SEAN: And the contingency plan is, keep everyone up there for a while?

LOREN: The contingency plan is an interesting one. This mission is a test mission. And so it really was meant to determine whether or not, you know, it is actually safe for Starliner to perform routine trips with people to and from the International Space Station. It was supposed to last roughly a week. At least that's what NASA said publicly. They did warn us that it could last much longer. So, where it started to get a little, you know, concerning is when they said that, you know, Starliner was certified to last up to 45 days in space because of its battery. Then they were ultimately saying, oh, we can actually extend that for another 45 days. It's not a problem. That's when the questions started to arise of ‘Is everything okay?’

SCORING IN <Sky Odyssey - APM>

*<*[*CLIP*](https://www.youtube.com/watch?v=PAIZHhrGqBM&t=1419s)*> STEVE STICH, PROGRAM MANAGER FOR NASA'S COMMERCIAL CREW PROGRAM: You know, we're taking our time on the ground to go through all the data that we have before we decide on the return opportunity.*

LOREN: Now they're talking about, okay, well, if Starliner isn't safe enough to bring Butch and Suni home, then we'll tap the other option that we have, which is SpaceX. And, SpaceX actually has another crewed mission coming up for NASA. It's called Crew Nine. That shows you where they are in relation to Boeing and their crew rotation schedule. They're up on their ninth regular mission for NASA. And Crew Nine was supposed to launch with four people, NASA astronauts and NASA partners, to the space station and last a total length of six months, which is a pretty standard rotation mission for SpaceX. Ultimately, NASA delayed the launch of that mission until late September to give them more time to figure this out. But now, they're not comfortable with bringing Butch and Suni home on Starliner.

*<*[*CLIP*](https://www.youtube.com/watch?v=gc2az3BI2h0)*> NASA ADMINISTRATOR BILL NELSON: NASA has decided that Butch and Suni will return with Crew Nine next February. And that Starliner will return uncrewed.*

LOREN: They will launch Crew Nine with only two astronauts on board, leaving two extra seats free. And then once they reach the station they'll carry out their six-month mission. And then when it's time to come home, sometime in the February time frame, Butch and Suni will fill those extra seats and come home along with the two Crew Nine astronauts.

*<*[*CLIP*](https://www.youtube.com/watch?v=gc2az3BI2h0)*> NASA ADMINISTRATOR BILL NELSON: The decision to keep Butch and Suni aboard the International Space Station and bring the Boeing Starliner home uncrewed is a result of a commitment to safety.*

SCORING OUT

SEAN: Boeing already had a lot of earthly problems. Did they need the extra problems in space? I don't want to kick them when they're down, but it feels like this is just more bad news for the reigning king of bad news.

LOREN: Yeah, I would say it definitely comes at a really awful time for the company. I would say most of the focus is likely on their airplane division. But their space division is definitely in need of some work. When it comes to the Starliner delays, over time they have racked up more than $1.6 billion in additional charges just because of all of the extra time that it has taken and the extra work that is taken to get Starliner ready and safe for this mission. So, it's not looking good. And I think having this on top of the mountain of problems that they are having on Earth is, you know, probably just the last thing that Boeing wants at the moment.

SEAN: And when the dust has settled on this and the astronauts are back at home and in their earthly beds, what do you think this whole episode will have told us about the bigger picture here, the bigger objectives of NASA and these two companies that are contracting for them?

LOREN: I think we're just seeing a new phase of NASA and the U.S. space program, the space race, if you will, where SpaceX is now, kind of the Goliath in the David and Goliath narrative.

SCORING IN <Lonely Shuttle - BMC>

LOREN: It really is a poetic irony, that I don't think anyone could have predicted. What is kind of tragic about this scenario, though, is the entire point of picking two companies for the program was to have multiple options in case something went wrong in a situation like this. There might have come a time when SpaceX had to ground its Crew Dragon, and so NASA wanted an option outside of Russia to bring home its crew or to launch its crew. And so we still seem to be reliant on this one single provider for the foreseeable future.

SCORING BUMP

SEAN: Loren Grush! Read her work at bloomberg dot com.

Ahead, one giant leap for *Today, Explained* – the first astronaut to be on the show.

*<CLIP> Liftoff!*

SEAN: She’s gonna tell us why she’s *jealous* of Butch and Suni.

[BREAK]

*<*[*BUMPER*](https://open.spotify.com/track/45M8DlDtPDA9ed9I04vKwZ)*> Space force, space force!*

SEAN: Colonel Cady Coleman. Astronaut! Welcome to *Today, Explained*. Our first ever astronaut on the program!

CADY COLEMAN (astronaut, scientist, author): Well, I think more of us will want to be on here because, I mean, who doesn't want Today, Explained?

SEAN: [laughs] Thank you. Well, I hope that's a good plug. We'll play that for the other astronauts we request. What’s space like, Cady?

CADY: [pause] I always have to take a breath and think, you know, how to say this, but it is like being transported to a different world. And I know, you know, I'm definitely still in this one same universe. Look down. See Earth. But it's, you really are at the edge, so to speak. And I felt really privileged to be one of the people who is the furthest away, meaning they're basically the closest to everything else we haven't seen.

SEAN: And one of the things you saw when you were in space most pertinent to our conversation today was the International Space Station.

CADY: I did, and I lived up there for almost six months.

SCORING IN <Ice Cream Truck EMDR - Ver A - BMC>

CADY: I really loved it up there. But that first sight, I mean, I was so used to, you know, doing spacewalking practice in our giant swimming pool where it's like 40 feet deep, the size of a football field and, and then you arrive at this pristine city in space, it was like being in Wonderland. And, Suni and Butch, you know, each, Suni had two missions to the space station already. This is her third. And Butch had one shuttle and then one station, and now he's up there. So they knew what they were coming to.

*<*[*CLIP*](https://www.youtube.com/watch?v=hqYnrES4Qj4)*> BUTCH WILMORE: This is the world of test. This is a tough business that we're in. Human space flight is not easy. Failure is not an option. That's why we are staying here now.*

CADY: And just being up there, getting to get so much stuff done. I look at the videos coming down and you look at their faces. I mean, they are just grinning so big and I, I don't think that those are for the cameras. I mean, they, it's a magical place. And I think what's really meaningful is knowing that everything that you do up there matters gets us one step closer to going back to the moon and going to Mars. And I don't just say that like it's a trendy thing to say, because I just think it's true.

*<*[*CLIP*](https://www.youtube.com/watch?v=FDOpdT381cs)*> SUNI WILLIAMS: I got to do some gene sequencing. I think you got to do some other science experiments as well with a moon microscope that was 3D printed. So we've been thoroughly busy up here, integrated right into the crew and… they're working very hard on the ground to make sure that we will be able to come home before too long.*

SCORING OUT

SEAN: Do you know these two astronauts, Butch Wilmore and Suni Williams?

CADY: I do. We all know each other, there’s... it's like one big family.

SEAN: Hm.

CADY: And, I arrived in 1992. Suni and Butch just a little bit later than that. I'm a little closer to Suni than I am to Butch, just because we have a little more in common. But I've done a lot of training with Butch in the T-38 airplanes that we fly to learn things. And, you know, he and Suni are both test pilots, and I am from the Air Force, but a chemist from the Air Force. So I had a lot to learn from each of them in terms of aviation and Suni just has this really kind of great attitude about, I mean, no matter whether it's, I don't know, organizing a neighborhood event or something in the astronaut office or being in this kind of situation, Suni just always has this very levelheaded but pretty joyful way of living that is always inspirational to me as a friend.

*<*[*CLIP*](https://www.youtube.com/watch?v=FDOpdT381cs)*> SUNI WILLIAMS: We are having a great time here on ISS. You know, Butch and I have been up here before and it feels like coming back home. It feels good to float around. It feels good to be in space and work up here with the International Space Station team. So yeah it's great to be up here, so I'm not complaining, Butch isn't complaining that we're here for a couple weeks, um, extra weeks.*

SEAN: And so when you heard that they weren't going to come back as early as hoped, what went through your head first?

CADY: Certainly. Some jealousy.

SEAN: Jealousy!

CADY: Yes! [laughs]

SEAN: Amazing.

CADY: [laughs] I would imagine many of us are. And at the same time, you know, it's, it's certainly their time to fly again. They've been very patient. So it's not like, oh, this could be mine. It's more just a little bit wistful because I really loved working up there and I think it's a great opportunity. But I, I also love watching folks that I know are just really invested and wonderful working up there. I tell people this is NASA at its very best.

SEAN: Wow!

CADY: It is taking the time to collect test data just like they should, even though the media, you know, keeps kind of emphasizing that the two people are stranded when this is just the way learning more about space and your capabilities works.

SEAN: Okay, you've, you referred to a few times the fact that they might be busy, that there's a lot to do up there, whereas I imagine most people think they're probably just like losing their minds. What are they doing up there?

CADY: First, there's a whole list of experiments and also maintenance that has to be done. I mean, my basic way of thinking about it is, we go up to space, we take away a huge variable, which is that they are basically weightless, not perfectly, but as close as you need to get to learn a lot. You get to measure things that were hard to measure on the earth. And we learn about things like combustion and about everything that in a factory that has to do with flow through a pipe. We learn about groundwater and erosion. And I mean, we learn how plants grow, don't grow. If we're going to grow corn on Mars, we probably don't need corn stalks because they're not going to have to hold themselves up very much. So it's like this, all these different ways of thinking scientifically. It's just another laboratory. It's almost like a brand new microscope, you know, a different way to look at things.

SEAN: So this is a great environment to conduct experiments. I also wonder, what do Butch and Suni need to do while they're up there, to make sure being in a near zero gravity situation doesn't take a toll on their bodies?

CADY: Exercise is the biggest answer that we've seen. I mean, without exercise, without some kind of countermeasure, astronauts were losing about a percent and a half of their bone mass every month.

SEAN: Wow.

CADY: So what a woman who's 70 years old who has osteoporosis loses in a year, I would lose in a month if I did nothing. It's a big deal.

SEAN: Hm.

CADY: So we looked at different things. We looked at different drugs and different kinds of exercise and exercise machines. And we've got a pretty good machine up there that, that's, it's a weightlifting machine, so to speak. And I know that doesn't sound like it's possible, but it's based on resistance. And they spend about two hours a day exercising. And about half of that is aerobic on a treadmill or a bike, keeping their hearts in shape. And about half of that is lifting weights. And we're finding that people are coming back with most of their bone mass.

SEAN: Between all the work and the exercise and probably some of the deliberation of, of how and when they're going to come home. How does an astronaut on the ISS find time to like, I don't know, say, duet with Ian Anderson from Jethro Tull?

CADY: [laughs]

*<*[*CLIP*](https://www.youtube.com/watch?v=XeC4nqBB5BM)*> CADY COLEMAN: Tonight Ian Anderson and I would like to honor Yuri Gagarin for his brave journey 50 years ago…*

CADY: [laughs] Well, in my case, I think most of the creative things that I did up there were probably done during time I was supposed to be sleeping. [laughs]

SEAN: [laughs] Oh, classic!

*<*[*CLIP*](https://www.youtube.com/watch?v=XeC4nqBB5BM)*> FLUTE MUSIC*

CADY: We are a small part of a really big place, and we belong up there. And the feeling I had when I came home was just that, you know, I knew I'd go to space. I just didn't understand that once I got there, I'd actually feel just as close to Earth. And so it just turns out that home is bigger than we thought.

THE FLUTE MUSIC BUMPS

SEAN: Colonel Cady Coleman. Flautist. We salute you. One time she dueted with Ian Anderson from Jethro Tull from the International Space Station. How many people can say that? Just one it turns out.

You can read all about her space experience in her new book: “Sharing Space: An Astronaut's Guide to Mission, Wonder, and Making Change.” Find it wherever you find your books.

Our show today was produced by Avishay Artsy. We were edited by Amina Al-Sadi, fact-checked by Matthew Collette, and mixed by Patrick Boyd and Andrea Kristinsdottir.

I’m Sean Rameswaram. This is *Today, Explained*.

[10 SECONDS OF SILENCE]