MY WEIRD PROMPTS

Podcast Transcript

EPISODE #178

The Skywave Secret: Why Aviation Can’t Quit HF Radio

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EPISODE SYNOPSIS

In this episode of My Weird Prompts, Corn and Herman Poppleberry dive into a surprising technological paradox: why modern aviation still relies on high-frequency radio technology from the 1940s for transatlantic crossings. Despite the rise of satellite constellations like Starlink and AI-driven navigation, the "scratchy" sounds of the ionosphere remain the ultimate fail-safe for pilots crossing the "Mid-Atlantic Gap." From the physics of skywave propagation to the growing threat of GPS jamming in 2026, this episode reveals why the oldest tech in the cockpit is often the most vital.

DANIEL'S PROMPT

Daniel

I was wondering why HF radio remains the norm for transatlantic crossings. Given the level of automation we have now and the existence of satellite technology, why do we still rely on humans speaking instructions over radio frequencies? Is that still the best system available, or are there better alternatives like satellite connectivity?

TRANSCRIPT

Corn

Hey everyone, welcome back to My Weird Prompts. I am Corn, and I am sitting here in our living room in Jerusalem with my brother. It is a crisp January morning here, and the winter sun is just starting to hit the Jerusalem stone across the street. It is actually quite peaceful, which is a nice contrast to the chaos of the topic we are diving into today.

Herman

Herman Poppleberry, at your service. It is indeed a beautiful day, Corn, but as you said, we are headed into some pretty technical territory. Our housemate Daniel sent us a fascinating voice note earlier. He was reminiscing about his time in West Cork, sitting near Mizen Head, watching the contrails of the Concorde and other airliners as they headed out over the Atlantic. He mentioned listening to the radio chatter on a shortwave receiver and hearing that characteristic crackle of pilots talking to air traffic control.

Corn

It is such a vivid image, right? Sitting on the rugged coast of Ireland, hearing that rhythmic hiss and realizing that those planes are about to leave the world of easy, clear communication behind. Daniel was asking a really pointed question: why, on this day, January sixth, twenty-twenty-six, are we still relying on humans speaking over scratchy high frequency radio for transatlantic crossings? With all the automation, the A-I reasoning models we have discussed, and the massive satellite constellations like Starlink, why does it feel like we are still using technology from the nineteen-forties?

Herman

It is a brilliant question because it touches on the intersection of physics, international regulation, and the sheer scale of the ocean. Most people assume that when you are on a flight from London to New York, you are always under the watchful eye of a radar screen and a crystal-clear radio link. But the reality of oceanic flight is much more... let us call it atmospheric. It is an archaeological site of technology, where layers of the past are still functioning as the foundation for the present.

Corn

Right, and as we discussed back in episode two hundred sixty-five when we talked about radio frequency hygiene, the spectrum is a crowded place. But the ocean is a different beast entirely. Herman, let us start with the basics for everyone. When a plane leaves the coast of Ireland or Newfoundland, what actually changes in how they talk to the ground?

Herman

So, for the first part of the flight, pilots use very high frequency radio, or V-H-F. This is what most people think of as standard aviation radio. It is clear, it is reliable, but it has one major limitation. It is line-of-sight. Because of the curvature of the earth, a V-H-F signal only travels about two hundred miles if the plane is at thirty-five thousand feet. Once you get further out than that, the signal just shoots off into space. You lose contact with the ground station. This is what created the famous Mid-Atlantic Gap during World War Two—a place where planes were essentially invisible and silent.

Corn

And that is where the oceanic gap begins. Traditionally, once you hit that limit, you switch to high frequency radio, or H-F. And this is where things get weird. Instead of a straight line, H-F radio waves actually bounce off the sky.

Herman

Exactly. It is called skywave propagation or skipping. The signal travels up to the ionosphere, which is a layer of the atmosphere ionized by solar radiation. There are actually different layers—the D-layer, the E-layer, and the F-layer. During the day, the D-layer is thick and actually absorbs some of the signal, but at night, it disappears, allowing the signal to hit the higher F-layer and bounce thousands of miles. It is how a pilot in the middle of the North Atlantic can talk to a controller in Gander, Newfoundland, or Shanwick in Scotland. But as Daniel pointed out, it sounds terrible. It is full of static, it fades in and out, and it feels incredibly old-fashioned.

Corn

It feels like listening to a ghost. I remember you showing me some recordings of this, Herman. It is that characteristic hiss and the rhythmic pulsing of the signal. So, if we have satellites, why is this still the standard? Why are we still asking pilots to report their position every ten degrees of longitude over a scratchy radio link in twenty-twenty-six?

Herman

Well, the short answer is that it is no longer the only standard, but it remains the mandatory backup. We have moved into an era of what we call controller pilot data link communications, or C-P-D-L-C. In twenty-twenty-six, most modern airliners are basically texting their position to air traffic control. They use satellites for this, and it is much more automated. But here is the catch, Corn. Satellites are not perfect, and they are not free.

Corn

That is an interesting point. We often think of satellite connectivity as this ubiquitous, infinite resource because we have things like Starlink for our homes. I saw a report just yesterday that British Airways and Aer Lingus are rolling out Starlink across their entire fleets this year. But aviation-grade satellite communication is a different level of certification, right?

Herman

It really is. To use a satellite for air traffic control, the system has to be incredibly resilient. It has to work during solar storms, it has to have guaranteed latency, and every airline has to pay for that bandwidth. High frequency radio, on the other hand, is free once you have the equipment. The air is free. And the International Civil Aviation Organization, or I-C-A-O, requires that planes have a non-satellite backup for long-distance communication.

Corn

So it is the ultimate fail-safe. But Daniel mentioned the level of automation we have now. If the plane knows exactly where it is via G-P-S, and the air traffic control computer knows where it should be, why do we need the human speaking the instructions at all? Can we not just automate the whole texting process via satellite and leave the radio for emergencies only?

Herman

We are actually very close to that. We have a system now called Iris, developed by the European Space Agency and Viasat, which is entering its full commercial phase this year. It allows for what we call four-D trajectory-based operations. Instead of just a flight plan, the plane and the ground are constantly negotiating the exact path through space and time. It is incredibly efficient. But there is a psychological and procedural hurdle. This reminds me of our discussion in episode two hundred eighty-one about reasoning models in A-I. We are getting better at letting machines handle the routine stuff, but humans are still the best at handling the edge cases.

Corn

Think about the North Atlantic Tracks. These are the highways in the sky that are rebuilt every single day based on the jet stream.

Herman

Exactly. Every morning and every evening, controllers at Shanwick and Gander look at the wind data and create a set of tracks that will save the most fuel. You have hundreds of planes all funneling into these tracks at the same time. The spacing is tight. In the old days, because of the inaccuracy of H-F radio and the lack of radar, we had to keep planes sixty miles apart. Today, thanks to space-based A-D-S-B—which is automatic dependent surveillance-broadcast—we can see planes in real-time via the Iridium satellite constellation. We have shrunk that spacing down to about fourteen or fifteen miles. But when things go wrong, like a sudden medical emergency or a rapid decompression, you need to talk to a human immediately. Data links are great for climb to flight level three-seven-zero, but they are not great for I have a fire in the hold and I need to deviate right now.

Corn

I see. So the voice element is about the speed of nuance. A pilot can convey urgency, stress, and complex intentions in three seconds of speech that might take thirty seconds to type into a flight management computer. And in aviation, thirty seconds is an eternity.

Herman

Spot on. And there is also the party line effect. On a V-H-F or H-F radio frequency, every pilot in the area can hear what everyone else is saying. If I hear a pilot ahead of me reporting severe turbulence at thirty-seven thousand feet, I can ask for a lower altitude before I even hit the bumps. With private data links, you lose that shared situational awareness. You are in a vacuum, only talking to the controller.

Corn

That is a fascinating second-order effect I had not considered. The radio creates a community of pilots who are all looking out for each other. But let us talk about the fragility Daniel mentioned. He noted that H-F radio is brittle. It depends on the ionosphere, which depends on the sun. What happens when the sun decides to be difficult? We are in a period of high solar activity right now, are we not?

Herman

We are. We are currently in the declining phase of Solar Cycle twenty-five, but activity is still incredibly high. Just last November, we had a massive X-five-point-one solar flare that caused global radio blackouts. When a solar flare hits, it can cause what we call an ionospheric blackout. The layers of the atmosphere that usually reflect the H-F signals start to absorb them instead. Suddenly, that skip stops skipping. You can have hundreds of planes over the Atlantic that are suddenly nordo, which is aviation slang for no radio.

Corn

That sounds terrifying. What does a controller do in that situation?

Herman

They follow the procedures. Everyone stays on their assigned track, at their assigned speed and altitude. The system is designed so that if everyone just does what they were last told, they will not hit each other. But it is nerve-wracking. This is why the push for satellite technology is so strong. We want a system that does not rely on the whims of the sun. But even satellites have their own vulnerabilities. If you are using a satellite in geostationary orbit, it is parked over the equator. As you fly further north, toward the poles, the satellite gets lower and lower on the horizon until eventually, the tail of the airplane might actually block the signal.

Corn

I remember reading about that. For those polar routes from New York to Hong Kong, they have to rely on different satellite constellations, like Iridium, which are in low earth orbit and cover the poles. But if those fail, you are back to H-F radio. It really is the bedrock of the whole system.

Herman

It is. And it is also about international equity. Not every country can afford to mandate multi-million dollar satellite systems for every aircraft that enters their airspace. But almost every country can maintain an H-F radio station. To have a global aviation system, you need a lowest common denominator that everyone can access. H-F is that denominator.

Corn

It is amazing how much of our modern world relies on these lowest common denominators that feel like relics. It reminds me of episode two hundred seventy-eight where we talked about the fragmented state of the global electricity grid. We want high-tech, but we are held back by the legacy of what we built eighty years ago.

Herman

It is the same principle. But I want to address Daniel's point about the Greece incident. He mentioned a recent failure due to radio frequency interruption. This is becoming a huge issue in twenty-twenty-six. We are seeing a massive surge in intentional and unintentional jamming of G-P-S and radio frequencies. In the first four months of twenty-twenty-five alone, there were over one hundred twenty-three thousand reported incidents of G-P-S interference in the Baltic and Eastern Mediterranean regions. Even the plane carrying the European Commission President was affected last August.

Corn

So if an adversary or even a malfunctioning piece of industrial equipment starts blasting noise on the satellite frequencies, the data link goes down. But jamming a high frequency signal that is bouncing off the ionosphere from three thousand miles away? That is much harder to do effectively over a large area.

Herman

Exactly. There is a certain robustness to analog. It is harder to hack a copper wire and a vacuum tube than it is to spoof a digital signal. But let us look at where this is going. We are seeing the rise of silent oceanic operations. This is the goal where voice radio is only used for the initial check-in and emergencies. Everything else is handled by computers talking to computers. We are seeing systems now where the air traffic control computer can automatically negotiate a trajectory change with the aircraft's flight management system without either the pilot or the controller having to speak a word.

Corn

That sounds like the automation Daniel was asking about. If the computers are doing the talking, does the pilot just become a monitor?

Herman

In theory, yes. But in practice, the pilot's role shifts to being a manager of systems. They are making sure the automation is making sensible choices. One of the things we are seeing in recent research is that when you remove the voice chatter, pilots can actually become less engaged. They lose that mental map of where everyone else is because they are not hearing the other planes. So, some developers are working on synthetic voice systems that take the data link messages from other planes and read them aloud in the cockpit to recreate that sense of community.

Corn

That is incredible. We are using A-I to recreate the problem of the old radio so that humans can stay oriented. It is like how electric cars sometimes pump in engine noise so pedestrians can hear them coming.

Herman

It is exactly like that. We are finding that the inefficiencies of the old system actually provided important safety cues that we did not realize we needed until they were gone.

Corn

So, to answer Daniel's question, we still have humans speaking over scratchy radios because it is the most reliable, globally accessible, and human-centric backup we have. It fills the gaps that satellites cannot reach, and it provides a level of nuance and community that data links just cannot replicate yet.

Herman

Right. And it is also worth noting that the humans are not just sitting there. The controllers at places like Shanwick or Gander are managing an incredibly complex three-dimensional puzzle. Even with automation, the sheer volume of traffic Daniel mentioned—hundreds of planes at once—requires a level of strategic thinking that we are still hesitant to hand over entirely to an algorithm. If two planes need the same altitude to avoid a storm, a human controller can negotiate that. An algorithm might just give it to the first one that asked, which might not be the safest or most efficient choice for the whole system.

Corn

I love that. It is a reminder that even in twenty-twenty-six, the human in the loop is not just a safety feature; it is a sophisticated processing unit that handles the stuff the code cannot.

Herman

Absolutely. And for the nerds out there, there is a system called S-E-L-C-A-L, or selective calling. This is one of my favorite bits of modernized old tech. Even though the radio is always on, the pilots do not have to listen to the static for eight hours. Each plane has a unique four-letter code. When the controller wants to talk to a specific plane, they send a tone sequence that sounds like a little melody. If the plane's receiver hears its specific melody, a light flashes in the cockpit and a chime sounds. Then the pilot turns up the volume and says, Shanwick, this is United one-two-three, go ahead.

Corn

So it is like a pager for airplanes. That is brilliant. It solves the listening to static problem while still using the old radio technology. It is a nineteen-seventies solution to a nineteen-forties problem that is still working in twenty-twenty-six.

Herman

Exactly. And companies like Collins Aerospace are still releasing brand new H-F radio models, like the H-F-nine-five-hundred, because the demand is still there. It is not going away anytime soon.

Corn

You know, hearing all this makes me realize that the weirdness Daniel noticed is actually a sign of a very mature, very safe system. We do not throw things away just because they are old; we layer new things on top of them until the old thing becomes the foundation.

Herman

That is the perfect way to put it. It is an archaeological site of technology. You have the nineteen-forties H-F radio at the bottom, the nineteen-seventies S-E-L-C-A-L on top of that, the nineteen-nineties satellite data links on top of that, and the twenty-twenties space-based radar and Iris system at the peak.

Corn

So, what does the future look like? If we are sitting here in twenty-thirty-six, ten years from now, will Daniel still hear that H-F crackle?

Herman

I suspect he will. We might see a shift where H-F becomes purely a dark backup—something that is never used unless everything else fails. There is a technology called H-F Data Link, or H-F-D-L, which allows the old radio frequencies to carry digital data. It is slow, like a dial-up modem from the nineties, but it works over thousands of miles without a satellite. We might see the voice part fade away, but the frequencies themselves are too valuable to abandon.

Corn

It is the Invisible Highway, just like we talked about in episode two hundred sixty-five. Every piece of the spectrum has a job to do.

Herman

It really does. And for the pilots, I think there is a certain comfort in it. When you are over the middle of the Atlantic, and it is three in the morning, and you are the only soul for hundreds of miles, hearing a human voice from a controller in Ireland or Canada makes the world feel a little less empty.

Corn

That is a lovely thought. It is the human connection in the middle of a technical marvel.

Herman

So, the next time you are on a flight and you look out at that vast expanse of blue, just remember there is an invisible web of radio waves bouncing off the sky, keeping you in touch with the rest of humanity.

Corn

And if you are lucky enough to be sitting on a beach in West Cork like Daniel was, maybe you can still catch a bit of that ghost in the machine.

Herman

Just make sure you have a good antenna. The ionosphere can be a fickle mistress, especially during this solar maximum.

Corn

I think that is a perfect place to wrap up the technical side of this. But before we go, we should talk about the practical takeaways for our listeners. Because most of us are not pilots, but this system affects us every time we travel.

Herman

True. The biggest takeaway is that redundancy is safety. In our daily lives, we often rely on a single point of failure—our phone, our internet connection, a single cloud provider. Aviation is the gold standard of what happens when you refuse to have a single point of failure. They have three radios, two satellite systems, and a backup plan for the backup plan.

Corn

It is a good philosophy for life, really. Have an analog backup for your digital world. Keep a paper map in the car. Write down important phone numbers. Because the ionosphere of our digital lives can go down too.

Herman

Definitely. And the second takeaway is about understanding the why behind seemingly obsolete technology. Often, when something looks old or broken in a high-tech field, it is there for a very specific, hard-won reason. It is usually the result of a lesson learned the hard way.

Corn

Chesterton's Fence applied to radio frequencies. Do not tear down the old radio tower until you understand exactly why it was built in the first place.

Herman

Exactly.

Corn

Well, this has been a deep dive. I feel like I understand the North Atlantic a lot better now. Daniel, thanks for sending that in. It is always fun to look at the low-tech parts of our high-tech world.

Herman

Yeah, it was a great prompt. It really makes you appreciate the layers of engineering that keep us safe.

Corn

And to all of you listening, if you have been enjoying My Weird Prompts and our little deep dives into the obscure corners of the world, we would really appreciate it if you could leave us a review on your podcast app or on Spotify. It genuinely helps other curious people find the show.

Herman

It really does. We love seeing the community grow. And remember, you can find all our past episodes and a way to get in touch with us at our website, myweirdprompts.com. We are also on Spotify, so make sure to follow us there for new episodes every week.

Corn

We have some great topics coming up, including a look at the future of deep-sea cables and why we still rely on physical wires at the bottom of the ocean. It is a similar theme to today, actually.

Herman

Oh, I am excited for that one. The physics of the abyss are even weirder than the physics of the sky.

Corn

I bet they are. Well, until next time, I am Corn.

Herman

And I am Herman Poppleberry.

Corn

Thanks for listening to My Weird Prompts. Keep asking those weird questions.

Herman

We will be here to help you find the answers. Goodbye for now.

Corn

Bye everyone.

Herman

See you next week.

Corn

Wait, Herman, did you ever actually try to build an H-F radio when we were kids?

Herman

I did! I tried to use the copper gutters on the house as an antenna.

Corn

Oh no. Did it work?

Herman

I managed to pick up a broadcast from a station in Moscow, but I also managed to give myself a very small electric shock. Mom was not happy about the gutters.

Corn

That explains a lot about you, actually.

Herman

Guilty as charged. Alright, let us go get some coffee.

Corn

Sounds good. Catch you later, everyone.