

EPISODE 306

[INTRODUCTION]

[0:00:08] IP: Hello and welcome to episode 306 of AvTalk. I am Ian Petchenik. Here as always with –

[0:00:15] JR: Jason Rabinowitz. Yeah, as you can expect, this is not going to be a happy episode. It's been a tragic week. It's been a terrible week across the board. But particularly in the aviation industry, it's been just a downright terrible, terrible week. Our plan for this episode is to give you the facts, give you the details, and have a discussion about what we know, what we don't know, and not a whole lot more than that. We have three topics. We're going to stick to those topics today. I think you all know where we're starting off. But Ian, take it away from here.

[0:00:55] IP: Yeah. We began the year in not a good way, and we'll talk about that story at the end of the episode. But we will start with how we ended the month, which was with two crashes within three days in the United States on the East Coast. We'll start with the mid-air collision in Washington, D.C. between a US Army H-60 Black Hawk helicopter and a PSA Airlines CRJ-700 operating on behalf of American Eagle.

The incident occurred at 8:48pm Eastern Standard Time as the Blackhawk was traveling north to south along the Potomac River on the transition from helicopter Route 1 to Route 4. And we'll come back to those helicopter routes in a moment. The CRJ was on approach to runway 3-3 after having shifted its approach from a runway 0-1 approach to allow for departing traffic on runway 0-1.

The NTSB has been on scene and has recovered the recorders from all three aircraft. And we got an initial briefing on the recorder data for the CRJ-700 on the 3rd of February, I believe. And that update provided us with information about the altitude at which the CRJ was when the collision occurred. The NTSB says that using a synthesis of ADS-B radar and flight data recorder data, the aircraft was at 325 feet plus or minus 25 feet at the time of the collision.

The combined flight data recorder and cockpit voice recorder from the Blackhawk has been recovered alongside the flight data recorder and the CVR from the CRJ. The NTSB is still

working on processing all the data for those recorders. They have said that the recorder for the Black Hawk does not contain timestamps in the data. That is being redone manually by the NTSB recorder specialists in order to sync all of the data between the radar data that's available, the ADS-B data that's available, the flight data recorder data and cockpit voice recorder data from both aircraft.

Yesterday, the 4th of February, the NTSB stated that the altitude shown on the controller scope for the Black Hawk at the time of the collision was 300 feet. But they clarify, and this is a big, big clarification, that figure is rounded to the nearest 100 feet.

[0:03:42] JR: So that could mean if the aircraft was at 251 feet, it is rounded up on their display, we assume, to 300 feet. When you're working with numbers that low, that's actually quite a dramatic difference.

[0:03:57] IP: Right. So this is information we do not yet have as to the precise altitude of the helicopter. Now, we can back up to logic and say, of course, the altitudes are roughly the same since they collided. But it's important to know that what we don't have yet is a specific altitude from the Black Hawk Helicopter itself, and we'll talk about that a little bit more in what we don't know. But for now, let's stick with what we do know and go back to the CRJ's cockpit voice recorder, which has been downloaded and read out. The NTSB provided a detailed briefing on some of the key points that were captured by the cockpit voice recorder in the CRJ. And all times that I'm about to list are in Eastern Standard Time.

At 8:45:27, the CRJ's autopilot was turned off. At 8:46:01, air traffic control makes PAT25, which is the call sign of the Black Hawk Helicopter, aware of the CRJ south of the Wilson Bridge. At 8:46:29, there's the 1,000-foot call -out from the CRJ. At 8:47:29, the 500-foot call-out is made by the CRJ. Those are automated call-outs from the aircraft so that the pilots have increased situational awareness about their altitude.

At 8:47:39, air traffic control asks if the helicopter PAT25 has the CRJ in sight. At 20:47 – sorry, I'm switching back, I have it listed in 24-hour time, but I'm trying to –

[0:05:48] JR: 8:47:40.

[0:05:50] IP: Yeah. 8:47:40, a traffic-traffic oral alert sounds. This is just an alert letting the pilots know that there's traffic in the area. This is not a TCAS resolution advisory instructing the pilots to do anything. This is just an oral alert that there's traffic in the area, and we'll come back to that in a moment.

[0:06:14] JR: And this is on the flight deck of the CRJ getting the traffic-traffic oral alert sound. Not on the helicopter and not in the air traffic control cab.

[0:06:22] IP: Yes. Right. This is all from the CRJ's CVR, the cockpit voice recorder. At 8:47:42, the DCA tower directs PAT25 to pass behind the CRJ. And so I want to break this out a little bit and talk about what the NTSB is saying and what we have heard on recorded air traffic control audio captured by the likes of LiveATC.net. And we've heard the air traffic controller speaking to the pilots of the helicopter. On LiveATC, we do not hear them return with a response. That is because the audio recorded by LiveATC.net is VHF only. So that's the audio channel from the DCA Tower and the audio channel from the CRJ-700. But the helicopter is broadcasting on UHF, so that's not picked up by LiveATC, but it is in fact, of course, heard by the air traffic controllers.

[0:07:29] JR: And I think this is something important that I want to point out. You mentioned it, Ian. But I want people to be aware when you watch on YouTube videos of aviation incidents, or non-incidents, or funny things, or whatever, keep in mind that not everything that the pilots of the aircraft or aircraft controllers are talking about or are putting over the air, you may not be hearing the full story. You may not be hearing everything that goes on, and that's exactly what happened here.

Whenever you watch one of these channels on YouTube that intends to bring you a story about what happened, always consume it with a grain of salt because what you're hearing may not and usually is not the full story.

[0:08:12] IP: Yeah, Jason's exactly right.

[0:08:13] JR: I'm getting off my soapbox now.

[0:08:14] IP: That's quite all right. But Jason's exactly right. In this case, there's an entirely different audio channel that's not being captured by publicly available information, generally speaking. If someone was listening to that UHF channel and recording, they may have that. But in this case, definitely, the air traffic controllers are hearing this and it's being recorded by air traffic control. We'll have that available as part of the full transcription of these events.

Let's see, where are we? 8:47:42, DCA Tower directs PAT25 to pass behind to the CRJ. At 8:47:58, the CRJ crew has a verbal reaction, and the airplane begins to increase in pitch. At 20:47:59, so one second later, there are sounds of impact, and the CVR recording stops.

A couple things here. One, the airplane begins to increase in pitch. That's coming from the flight data recorder, obviously, but it's also borne out by data, both ADS-B data, and visual evidence that we've seen that includes the video taken from the runway direction where we begin to see the CRJ make a pitch increase and turn to the left just before the collision.

The other thing I want to note, and I kind of mention this just a moment ago, is that when we get the transcript, we've talked about this before, but it's worth repeating because there's been a lot of honest inquiry and perhaps disingenuous inquiry this week about the cockpit voice recorder audio. That is never released. Federal law prohibits the release of the audio recording. ICAO Annex 13 standards also prohibit the release of the audio recording.

[0:10:08] JR: I wasn't even aware there was discussion of this.

[0:10:12] IP: Yes.

[0:10:12] JR: Are people calling for it to be released or what's even happening?

[0:10:16] IP: There was some honest inquiry that we responded to about, "Are these ever released? Do you ever get to hear the audio?" And there were some honest questions. And then there was maybe still earnest, but I think misguided or perhaps – I don't want to speculate why, but the arguing that they should release the audio because, if they don't, there's obviously something to hide. That's just not the case. That's just not how this works.

[0:10:44] JR: Not how this works. For the dignity of the flight crew, this does not and will never and should never be released. I guess there may be cases where there are investigations where everyone survives and it's fine, where they can play the audio back to the crew. But in this case, you will never and you should never hear this recording. There is no reason to hear this. There's nothing for you to learn from hearing it. The transcription is all you need.

[0:11:09] IP: Yeah. And so there will be a full transcript of the cockpit voice recorders for both aircraft. And those are usually heavily annotated with flight data recorder and other data so that the final report and the docket that the NTSB puts together will portray the incident as it occurred so that you can learn everything there is to know about this and, in the interest of safety, prevent it from ever happening again.

What else do we know? We know that there were five air traffic controllers in the DCA Tower at the time of the accident. One local controller working fixed wing and helicopter traffic. That's been up for discussion this week already as there is a position for fixed-wing aircraft and a position for helicopter traffic. Those are separate positions during certain times of the day. During certain other times of the day, those are combined positions.

At that time, the position had been combined. The NTSB and the FAA are looking into levels of staffing and when those positions can and should be combined. And that's going to be something that investigators are looking to that will be playing into the final report. Also, in the tower cab were a ground controller, a local assistant controller, which you do not hear on the audio at all but is in the tower cab. You also have a supervisor and one supervisor in training who is training at the time. Those FAA controllers have been interviewed by the NTSB and the other interviews are ongoing.

Today and yesterday, a majority of the CRJ was recovered from the river and has been moved to a secure facility at DCA for further investigation and analysis. The NTSB says it believes later this week. By the time this podcast comes out on Friday, I believe, if all things go according to the plan that the NTSB has laid out, the Black Hawk will have been recovered by then and also moved into the hangar in DCA. That's what we know. It's not a lot. It is certainly as humans who have an interest in this from an aviation perspective, from a shocked fellow human perspective,

we, of course, always want to know more. But this is why the NTSB is here and will do their jobs.

Jason, let's talk about what we don't know, because I think that's helpful in this context as well.

[0:14:02] JR: Yeah, and there's certainly enough of that to have a whole other conversation.

[0:14:04] IP: There's certainly a lot. Yeah, but I want to touch on two things. One, we don't know yet the altitude of the helicopter, or should I say the altitude at which the helicopter believed it was at?

[0:14:17] JR: Yes, very important distinction there. We have no idea what the helicopter was reporting its altitude, whether it was correct, incorrect. At this point, I mean, it doesn't really matter, but it is pretty critical that we actually do know that information.

[0:14:32] IP: Right.

[0:14:33] JR: But we don't. We do not know that yet.

[0:14:34] IP: We do not yet know that. So that will be part of the flight data recorder and cockpit voice recorder readout from the Black Hawk. We also don't know what the helicopter crew saw or didn't see. And this is a question of a few things. One is in air traffic control audio that we talked about, where the ATC is asking if the helicopter crew has the CRJ in sight, there were multiple aircraft on approach. We know they had an aircraft in sight, but we do not yet know if it was the correct one. That's one question outstanding.

[0:15:14] JR: Right. As there were multiple aircraft coming into multiple runways. Staggered, of course, but the approaches to both runways are very similar up until kind of the last minute or two where they kind of – as this flight did, they break off to the right a little bit and then line up on final. But for the most part, they're approaching in perpendicular to each other, I guess is the word I'm looking for? No, that's not right. I'm not sure. It's been a long day. but the approaches are very similar up until the very last minute is what I'm getting at.

[0:15:47] IP: Right. There's a slight shift. What Jason's talking about is the runway one versus runway 3-3 approach. The approach is the same up until a certain point at which point the runway 3-3 approach shifts to the right and then loops left across the river for a landing. And they are, for the most part, the same approach until –

[0:16:12] JR: Until they're not.

[0:16:13] IP: Very short find. I mean very close to the runway. The other question outstanding, and this is something that the NTSB is looking to answer in a variety of ways, this training flight that the US Army helicopter was on included proficiency with night vision goggles. What we do not yet know is whether or not those night vision goggles were being employed at the time of the crash.

[0:16:40] JR: Yeah, and this is going to become very important to understand. Because, yes, the crew could have been using night vision, which would enhance, theoretically, what they're able to see. But remember where this crew is operating. They're over Washington, D.C., which is a very dense area. Those night vision goggles, if they were wearing them, would enhance a lot of light from everywhere else. It would be very hard with those goggles potentially on to spot an aircraft. And if they were on, I have never worn them, but what I have read is that depending on what type, it severely cuts down on your peripheral vision. If there was an aircraft to the left and they're looking straight, they might not see another aircraft conflicting traffic that they're not aware of because they're wearing night vision goggles. Anyone that suggests, "Oh, they should be wearing night vision and then they'll see everything." It might have actually hurt more than it helped in a lot of situations, potentially this one, but we don't know.

[0:17:39] IP: Exactly. The NTSB is looking into that. And on the briefing of February 2nd, I believe, investigator in charge, Inman, went into some details about how they would determine what the crew was using at the time and whether or not they were using night vision goggles. So I thought that was very interesting talking about what position are the night vision goggles. Obviously, if they're in bags, the storage bags, then that's a pretty easy answer. But if they were on their helmets, in what position do they find them and things like that, I thought it was a very interesting discussion that he brought up.

Those are the major points that we wanted to cover as far as what we don't know. And then there's a few other things aren't part of the specific – well, they are part of the specifics of the crash, but are wider topics for discussion. And one of those are the helicopter routes in D.C. and what exactly those are. In a few major metropolitan areas around the United States that have a preponderance of helicopter traffic, and Washington, D.C. is absolutely one of those, the FAA has structured the airspace to allow for specific helicopter routes to facilitate traffic both around the urban area, but also to keep things, hopefully –

[0:19:00] JR: Theoretically.

[0:19:01] IP: – theoretically separate from commercial aviation. The route that the Army helicopter was on is Route 1, and they were transiting from Route 1 to Route 4, flying north to south. At the area around DCA, both of those routes have a maximum altitude of 200 feet. And that is very important in this discussion, as we have data from the NTSB saying that the CRJ was at 325 feet plus or minus 25 feet.

[0:19:40] JR: Yeah. It's an extremely constrained airspace in a way that is extremely atypical. I can't really think of anywhere else where this is the case. If my very quick Googling is correct, the FAA only has a very few number of these helicopter routes charted. One of them, of course, being the Baltimore-Washington region, Boston, Chicago, Dallas-Fort Worth, Detroit, Houston, LA, and, of course, New York as I watch a helicopter fly outside the window right now. There are very few places in the country where helicopters have defined routes such as this. And there are even fewer, probably none other, in the country where helicopter routes take you so close under VFR operations to a very busy commercial airport, especially at such an extremely low altitude where, obviously, things can go wrong. Typically, these routes would take you over the top of an airport where you don't interfere with any of the operations. But DC, like many other things, is a whole world of its own.

[0:20:47] IP: And let's talk about those VFR flights. Because on average, in December of 2024, per FAA data, there were 28.6 VFR overflights of DCA each day.

[0:21:00] JR: That's a lot because it's probably mostly condensed to daytime hours or hours when people are awake. There's not going to be many operations at 3, 4, or 5am. So, it may not sound like a lot. What was it? 26 average per day.

[0:21:17] IP: 28.6, yeah.

[0:21:18] JR: 28.6. If you're squeezing those into daylight hours or fringe, it's quite a lot of operations on top of what is already an extremely busy airspace.

[0:21:27] IP: Yeah. Let's talk about what has happened to those helicopter routes. Route 1 and route 4 in the area around the airport, all the way to the Wilson Bridge, have been closed to traffic. The FAA has suspended helicopter traffic on those routes at least until the NTSB's preliminary report is issued and the FAA has a chance to review it.

[0:21:51] JR: Probably wise?

[0:21:53] IP: Yeah.

[0:21:53] JR: Especially if we don't know what actually led to this crash. It's best to just rule it out entirely right now. Kudos to the FAA for doing that, I guess. Credit where it's due. This is probably overdue, but better late than never so it doesn't happen again, at least until the preliminary report. Which is what? About a month from now?

[0:22:15] IP: Yeah. Generally, the preliminary reports are issued within 30 days, or they try to issue them within 30 days. We're looking at the end of February basically. Let's talk about TCAS because we have the report of the traffic-traffic oral alert on the CRJ's cockpit voice recorder. But we don't have any indication that there was a resolution RA because these aircraft were below 1,000 feet. Below 1,000 feet, TCAS RAs are inhibited. And below a certain altitude, I want to say it's 400 feet, but I'm not exactly sure on the CRJ all TCAS alerts are inhibited. Because at that point, the pilots are meant to be focusing on landing the aircraft or departing the aircraft. And so those are deemed extraneous alerts at that point and not something the pilots can really focus on as they're attempting to land the aircraft just a few hundred feet above the ground. Below a thousand feet, TCAS RAs are inhibited. So there would be no resolution.

But just days before this crash, a Republic ERJ-175 received a TCAS RA for a different Army helicopter. They were instructed to climb. They climbed, they went around, they landed. That is being investigated as part of the investigation into this accident by the NTSB. Okay, why wasn't the helicopter tracked by Flight Raider 24?

In this case, the helicopter was not sending ADSB data. It was only sending Mode S data, which is the older transponder version, most military aircraft, by law and by agreement with the FAA, are not required to broadcast ADS-B, even when operating in commercial airspace. A lot of them do. You can track a large amount of military traffic on Flight Raider 24, either by ADS-B or more likely by MLAT.

MLAT requires – and this is a technology where we use the time difference of arrival of the signals from the aircraft to our fixed and known point receivers to calculate the position of the aircraft. That requires at least three of our receivers to get the same signal from the same aircraft in order to calculate those positions. Unfortunately, that didn't happen here. We did receive the raw Mode S data and that's been published and we have a link to that data on the blog, but that is just altitude and call sign information. Unfortunately, we were unable to calculate a position for this aircraft.

I guess this is my plug for if you want to host a receiver, please do apply. The more receivers that we are able to send out to areas of high traffic, the more MLAT positions, we will be able to calculate for aircraft all around the world. This is something that, in the face of an increase, especially in GPS interference, taking away ADS-B tracking in certain areas, we are certainly focusing on reinforcing our ability to track every single aircraft via M-LAT so that we have a fallback when ADS-B is not available. Okay, that, believe it or not, was the easy part of the discussion.

[0:25:58] JR: Yeah, and I learned a few things along the way, and I hope you did too. I, for one, have never looked at helicopter charts before. I've never bothered to learn anything about them. I don't even think I knew they existed before, but I pulled one up now. And Ian, I don't know if you've ever looked at one, but they're actually quite a bit different than regular aircraft sectionals or charts.

[0:26:21] IP: Yeah.

[0:26:22] JR: We'll link at least to the BWI one, Baltimore-Washington.

[0:26:26] IP: The DC one's in the blog post for all of the data for this. It's in there.

[0:26:30] JR: There you go. And I have one loaded up for New York, and I've really never looked at one before where they call out and actually have depicted visually things like bridges and buildings like the Williamsburg Savings Bank Tower in downtown Brooklyn. And now I know that the helicopter route I see outside my window every day is called Park. The more you know

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[0:26:54] IP: The more you know.

[0:26:56] JR: Yep. Visualize the little NBC thing from the 90s in the background right now because I did not know that before this.

[0:27:04] IP: Let's talk a little bit about the investigation and how that has gotten started. And what are some of the challenges unique to this particular investigation that we haven't seen before?

[0:27:24] JR: Oh, that's a kind way to put it.

[0:27:27] IP: And I don't want to get too far into this because I know that we often get messages from folks who say that they enjoy our matter-of-factness, I guess you could say. And I strive for that. I really do. But I think that it's worth discussing the NTSB's professionalism and especially investigator in charge, Inman's humanity, and how he has been briefing the public and the press, an assault on, I would say, their historical independence as an agency. I mean, the NTSB is fiercely independent and oftentimes punchy when it comes to dealing with other organizations like the FAA or, depending on your various modes of transport, the Federal Railroad Administration and so on and so forth. But for the President of the United States to give a press

conference in which he opines on the cause of an accident, even before the NTSB has had the chance to brief the press, I think is unhelpful. And I'm being very charitable there with that word.

[0:28:36] JR: You are being extremely charitable. And that now infamous press conference, if you can call it that, I don't think press conference is the right terminology, but the only relevant government agency that did not get a chance to speak was the NTSB. The president himself spoke. I think the DOD spoke. The FAA spoke. The DOT spoke. The NTSB, the only government agency that should have been saying anything, was the only one that wasn't given an opportunity to say a word in that press conference.

And as our friend Jon Ostrower points out on – actually, not just Jon Ostrower. This article is co-authored by Jon Ostrower himself, Will and Elon of The Air Current, the headline is Trump upends decades-old global air safety investigatory norms. Subhead, a rush towards speculation and blame could compromise the vital work of the NTSB. And I think that's a great way to put it.

Air safety investigations have gotten to such a place that you can trust them, you can believe them, you can know that the work the NTSB is doing is crucial, it's independent, it is truthful, and it is reliable that what they are saying is the word that you can believe. It is very difficult to comprehend and internalize what happened in that press conference. If you haven't seen it, do yourself a favor. Do not watch it. You won't learn anything. You will damage your brain a bit because I still cannot process what happened, but it is extremely not helpful to, at that stage, know basically no facts and to come out with speculation and incendiary commentary about what you think happened and then broadcast it as the president of the United States to the world. It is everything that should not have happened that did happen. I don't know where else I'm going with this.

[0:30:43] IP: I think that's where to go.

[0:30:45] JR: It was one of the most gut-wrenching things as someone who's been involved in this industry for a decade-plus to have to watch that. It was like already being down on the ground, having punched in the gut to now being kicked while you're down. Just nobody in this industry needed that. And I hope everyone listening could at least agree on that.

[0:31:06] IP: Yeah. I think that the NTSB thus far, in light of that –

[0:31:12] JR: Absolute professionals. An

[0:31:14] IP: An incredible job of not only quickly gathering data and providing thorough briefings to the press and public. And so nothing but good things to say.

[0:31:26] JR: No. And I hope they are allowed to do their job unfettered, uncompromised. And whatever report they put out would be no different than it would have been in 2020, 2016, or any year prior to that. The presidential administration should have no bearing on what the NTSB does or says. And if we find out at some point in the near future that there is some impact on it, I truly don't know where we go from here because that will be devastating.

[0:31:56] IP: Let's shift the conversation from Washington D.C. to Philadelphia, where just two days after the mid-air collision over the Potomac, a Learjet 55 air ambulance crashed shortly after takeoff from Northeast Philadelphia Airport. The air ambulance flight was operating from Northeast Philadelphia, making a stop in Springfield, Missouri, before continuing on to Tijuana. There were six people on board, including a young girl who had just finished a round of treatment at a Philadelphia hospital. The aircraft departed at 6:06pm Eastern and crashed just one minute later.

The highest recorded altitude that we received from the aircraft was 1,650 feet. The aircraft achieved the highest recorded vertical rate was 11,008 feet per minute as it descended toward the ground. Video evidence, which we're not going to link to if you haven't seen it by now, again, you don't need to, shows the aircraft traveling at a near-terminal velocity into the ground. That's borne out by the large impact crater that was created by the aircraft in which the NTSB has already recovered the cockpit voice recorder, which was recovered eight feet underground.

[0:33:29] JR: Yeah. Realistically, private aviation is far more prone to incidents than commercial aviation. However, it is rare, I think, to have an incident like this in such a densely populated area, such as outside Philly like this, which is what makes this so much worse. Because, typically, we may not have even brought this up otherwise if this wasn't right after another crash

and it wasn't so impactful quite literally in a dense neighborhood. But this one was particularly just really awful to see.

[0:34:05] IP: Yeah. The flight data recorder has not yet been recovered. The NTSB is still looking for it. They are asking for help from folks in the area that if they find anything that they believe to be a piece of the aircraft to alert the NTSB, contact them. You can always contact the NTSB should you have the need at witness@ntsb.gov. If you're listening to this in the Philadelphia area and you find something, let the NTSB know. Don't touch it. Two investigations ongoing. We will of course keep everyone updated as those investigations progress.

Finally, as in our final story. Not, finally, we've been waiting very long time, because this report is roughly right on time a month after the crash of the Azerbaijan Airlines flight that crashed in Aktau, Kazakhstan. This crash occurred just at the end of last year. And investigators from Kazakhstan have released their preliminary report. The preliminary report, as best Jason and I can tell, and we think we've looked in the place where there should be an official English translation version, we cannot find one.

[0:35:23] JR: And you know what? It's fine in translated, what is it, the Kazakh version of it?

[0:35:29] IP: It's the Russian language version.

[0:35:31] JR: The Russian language version. And I think it's okay that there isn't an English version because this preliminary report is amazingly comprehensive. Hats off to the team investigating this crash and putting out the report because they could have very easily released a one-page, "Hey, this thing happened," report. They did not.

[0:35:53] IP: This is not that.

[0:35:54] JR: They went in the opposite direction and it is one of the most comprehensive reports, preliminary reports I have come across in a very long time.

[0:36:03] IP: What we have done is I spent a good bit of time yesterday using a machine translator to translate the report from the Russian language report into English and then

reformatting it so that it contains much of the formatting from the Russian language report. So it follows along in the same vein.

[0:36:29] JR: You both did a very good job.

[0:36:32] IP: Thanks. But more importantly, both versions are available. The photos from the report are in the original one. I didn't port much of those over just in an effort to keep the file size smaller. But both of those are available in our blog for this particular accident. More importantly, what did we learn? The preliminary report confirms a number of things that we intoned from ADS-B data or visual evidence, because there were multiple videos of the crash, and also transcripts from air traffic control that were unofficial.

The preliminary report helps us confirm a timeline of events and more so what happened to the aircraft. We now know that the aircraft suffered catastrophic damage from an exterior force which disabled all three of the Embraer E190's hydraulic systems. That incident forced the crew to manage the aircraft on differential thrust alone.

[0:37:39] JR: And just the hint of hearing, managing aircraft with differential thrust alone. Anyone who knows what that means. And will tell you what that means. But if you already know, that sends shivers down your spine because that is dire circumstances. Ian, what does flying the aircraft on differential thrust alone mean?

[0:37:59] IP: Flying on differential thrust. Let's talk about what you normally fly with, and then we can talk about flying on differential thrust. Normally, on an aircraft, you have ailerons, or movement control surfaces on the wings, which help roll the aircraft from right to left. You have an elevator, which moves up and down, which helps move the aircraft up and down. And you have a rudder which helps move the aircraft in the yawing motion. So the kind of side to – I don't know why I'm doing this with my hand like anyone can see this right now.

[0:38:33] JR: We can feel it.

[0:38:33] IP: But we have some visuals that we can add. But all three of those control surfaces default. And we'll walk through exactly the timeline of events here in a moment. But all three of

those control surfaces became inoperative. The only thing the pilots had left was the shape of the aircraft and the ability to control how much thrust each engine was producing using the thrust levers. And that allows the pilots to manage the aircraft as best they can from Grozny all the way to Actau across the Caspian Sea.

Obviously, since the crash, we've been thinking in the back of our minds about United 232, which crashed in Sioux City, Iowa. That was a DC-10, which was using differential thrust to manage the aircraft after one of the engines had an uncontained engine failure and disabled all of the aircraft's hydraulics. So definite parallels to that accident as well here.

Let's walk through a timeline of events that is a combination of flight data recorder and cockpit voice recorder readouts as put together by the Kazakhstan Ministry of Transport. And these times are all UTC. Timeline of events. At 3:55 UTC, the aircraft takes off from Baku for Grozny. At 4:36:50, the flight approaches Grozny and reports loss of both GPS. There's GPS 1 and GPS 2, two receivers, two channels that the aircraft has available. Both have failed. That's not uncommon in this area where GPS jamming and spoofing is a unwelcomed fact of life these days. Thanks to military conflict and, in this case, Russian government trying to jam GPS in the region as a defensive measure. They requested an NDB approach. So they can't use GPS. And they are requesting a non-directional beacon approach from the Grozny Tower.

At 4:53:19, they conducted their first go-around. The crew eventually goes around twice. They made two landing attempts. At 4:53:19, they made their first go-around. They announced their intent to go around and they circled back around after some vectoring and trying to manage a fresh approach with the tower. At 5:11:42, they announced their intention to go around for a second time and tell air traffic control that they're going back to Baku. Both go-arounds were induced by weather conditions. The weather conditions at the time were not good. And in combination with a non-precision approach, they decided we're just going to go back to Baku. That's 5:11:42.

At 5:13:31, the CVR records what the Ministry of Transport terms a sonic boom and an audible alarm for the disabling of the autopilot and autothrottle sounds. At 5:13:34, pressure in the third hydraulic system drops to zero PSI, the fluid level in the third hydraulic system drops to zero percent. The control surfaces, including the elevator, aileron, and rudder, are fixed in the neutral

position and remain in this position until the end of the flight. From 5:13:34 to 6:27:58 when the aircraft impacted the ground, the only thing keeping that aircraft in the air was the two pilots managing the aircraft with differential thrust in the engines.

[0:42:30] JR: Which is just outstanding work to be able to not just fly the aircraft, but get as far as they did and actually basically line up with the runway. Unfortunately, it didn't pan out that way. But reading through at least the English version of the transcription, the professionalism of this crew stands out to me in particular. Their aircraft was just hit by a missile, presumably. They don't know what's going on. They go from it was a bird strike to actually maybe it was an oxygen bottle in the rear of the aircraft exploded. They're getting all sorts of malfunction errors on board, depressurization, passengers are passing out due to the altitude, but they still have the wits about them to properly declare a Mayday and then greet the different air the controllers they're talking to with terms like "good day." It's just absolutely outstanding work, not just flying the aircraft and damn near getting it down onto the ground, but communicating their issue. Their check-in with the final airport is "Mayday, Mayday, Mayday. Azerbaijan 8243. Aktau Tower. Good day. We have lost control surfaces and are managing the aircraft using thrust levers. Request emergency landing on runway 1-1."

This flight crew was so calm, so cool, so collected in an unimaginable emergency. Honestly, they should be held in the highest regard of aviation lore, I think, honestly. In the same vein that the flight crew of United 232 is, I hope this crew isn't forgotten to time because what they did to get the aircraft as far as they did and have at least a couple of survivors is just absolutely uncanny. It's amazing work. And I encourage everyone to read through the transcript, the English version. Or if you can read Russian, please. But this is just a masterclass on handling an emergency situation like this, in my opinion.

[0:44:40] IP: Yeah. 67 people on board, 38 fatalities, and 29 injuries. 29 people survived this crash.

[0:44:51] JR: Which is just outstanding.

[0:44:54] IP: That is down to the sheer professionalism of this crew, flying an aircraft that had been hit by two external objects that we now believe to be surface-to-air missiles. The preliminary report, the Russian language version, includes a variety of diagrams.

[0:45:13] JR: In English, helpfully.

[0:45:14] IP: A lot of diagrams are in English, yeah. But also, some discussion about the shrapnel damage, the impact damage, both exterior to the aircraft, interior to the aircraft, as well as metal fragments that are not part of the aircraft that were recovered from the stabilizer and APU areas. Have a look. Even if you don't read Russian, have a look at the original version of the preliminary report that we've linked to so that you can get the full picture there to see what has come out. It'll be interesting to see what new information is gained from the final report. Obviously, there will be a more in-depth timeline and hopefully some investigation into exactly what was fired and why it was fired at this particular aircraft, but a thorough preliminary report from the Kazakhstan Ministry of Transport Investigators thus far. Well worth a look.

Not a great week for aviation, but I'm heartened by the fact that there are people who take their job seriously and who put the work into creating and maintaining what still is the safest form of transportation. My hats off once again to all of the accident investigators who are doing the hard and near-impossible work. Thank you all.

This has been episode 306 of AvTalk. I am Ian Petchenik. Here as always with –

[0:46:45] JR: Jason Rabinowitz. Thanks for listening.

[END]