

National Transportation Safety Board

Office of Research and Engineering

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COCKPIT VOICE RECORDER

Specialist's Factual Report

December 11, 2023

WARNING

The reader of this report is cautioned that the summary of a cockpit voice recorder audio recording is not a precise science but is the best product possible from a National Transportation Safety Board investigative effort. The summary or parts thereof, if taken out of context, could be misleading. The summary should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the summary as the sole source of information.

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A. ACCIDENT

Location: Hayden, Colorado
Date: January 22, 2022
Time: 11:58 mountain standard time (MST)
Airplane: Airbus A320-232, JetBlue Airways, N760JB

B. COCKPIT VOICE RECORDER SPECIALIST

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C. FEDERAL CARRIAGE REQUIREMENTS

Per federal regulation, turbine engine-powered aircraft operating under Title 14 *Code of Federal Regulations* (CFR) Part 121 must be equipped with a cockpit voice recorder (CVR) that records a minimum of the last 2 hours of aircraft operation.

D. DETAILS OF THE INVESTIGATION

A CVR group was not convened. The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model: Honeywell HFR5-V
Part Number: 980-6032-023
Recorder Serial Number: CVR-08438

1.0 Recorder Description

This model CVR, the Honeywell HFR5-V, records a minimum of 120 minutes of digital audio stored on solid-state memory modules. Four channels are recorded: one channel for each flight crew, one channel for a cockpit observer, and one channel for the cockpit area microphone (CAM).

1.1 Recorder Damage

Upon arrival at the laboratory, it was evident that the CVR had not sustained any heat or structural damage and the audio information was extracted from the recorder normally, without difficulty.

1.2 Audio Recording Description

Each channel's audio quality is indicated in Table 1.¹

Table 1. Audio Quality

Channel Number	Content/Source	Quality	Duration
1	Spare/Observer	Excellent	02:10:56
2	Copilot	Excellent	
3	Pilot	Excellent	
4	CAM	Good	03:12:07

1.3 Timing and Correlation

Timing on the transcript was established by correlating CVR events to common events on the flight data recorder (FDR). Specifically, radio transmissions that the airplane made were correlated to the radio transmit microphone key parameter from the FDR. Next, an offset of the CVR to local time could be determined using the recorded coordinated universal time (UTC) parameter on the FDR. The relationship between CVR elapsed time and local time, MST, is given by the following expression:

$$\text{CVR Local time (MST)} = \text{CVR elapsed time} + 09:45:04 \text{ (hh:mm:ss)}$$

Timing in the summary is expressed in local time, MST, unless otherwise noted.

1.4 Description of Audio Events

A CVR group did not convene. A summary of events from the CVR is provided in Appendix B.

As part of the NTSB's investigation, the accident flight crew was invited to listen to the CVR and provide any comments or corrections to the summary report. On December 1, 2023, the accident flight crew met in the NTSB's laboratory, listened to the CVR, and reviewed the draft summary report. The accident flight crew did not have any comments or corrections to the CVR summary.

Submitted by:

Kyle Garner
Sr. Aerospace Engineer – Recorder Specialist

¹ Refer to Appendix A for the CVR Quality Rating Scale.

APPENDIX A. CVR QUALITY RATING SCALE

The levels of recording quality are characterized by the following traits of the cockpit voice recorder information:

Excellent Quality Virtually all of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate only one or two words that were not intelligible. Any loss in the transcript is usually attributed to simultaneous cockpit/radio transmissions that obscure each other.

Good Quality Most of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate several words or phrases that were not intelligible. Any loss in the transcript can be attributed to minor technical deficiencies or momentary dropouts in the recording system or to a large number of simultaneous cockpit/radio transmissions that obscure each other.

Fair Quality The majority of the crew conversations were intelligible. The transcript that was developed may indicate passages where conversations were unintelligible or fragmented. This type of recording is usually caused by cockpit noise that obscures portions of the voice signals or by a minor electrical or mechanical failure of the CVR system that distorts or obscures the audio information.

Poor Quality Extraordinary means had to be used to make some of the crew conversations intelligible. The transcript that was developed may indicate fragmented phrases and conversations and may indicate extensive passages where conversations were missing or unintelligible. This type of recording is usually caused by a combination of a high cockpit noise level with a low voice signal (poor signal-to-noise ratio) or by a mechanical or electrical failure of the CVR system that severely distorts or obscures the audio information.

Unusable Crew conversations may be discerned, but neither ordinary nor extraordinary means made it possible to develop a meaningful transcript of the conversations. This type of recording is usually caused by an almost total mechanical or electrical failure of the CVR system.

APPENDIX B. CVR SUMMARY

The first 59 minutes of the recording contained audio from the flight before the accident flight, from Fort Lauderdale-Hollywood International Airport (FLL) to Yampa Valley Regional Airport (HDN), which was uneventful. The summary, in Table 3, begins at 11:47:17 MST with the airplane on the ground at HDN as the flight crew prepared for the accident flight leg from HDN to FLL. For this leg, the captain was the pilot flying (PF), and the first officer was the pilot monitoring (PM).

Selected radio transmissions from about 11:48 to 12:02 MST between the accident airplane, a Beechcraft Super King Air², and the Denver Air Route Traffic Control Center³ are transcribed verbatim in the summary.⁴ Any over-the-air communication in the summary is italicized, while intra-airplane communication is not. Additionally, Table 2 is a list of abbreviations for the speakers that are transcribed in the summary.

Table 2. Abbreviations for speakers in summary.

Summary Abbreviation	Source
PF	JetBlue pilot flying
PM	JetBlue pilot monitoring
KA-1	King Air pilot
KA-2	King Air copilot
CTR	Denver center air traffic controller
UNI	Individual transmitting on HDN UNICOM

² Registration N350J, the conflicting traffic landing on runway 28 at HDN.

³ Referred to as Denver center in the summary.

⁴ Radio transmissions to/from other aircraft and air traffic control were not transcribed or summarized.

Table 3. CVR summary.⁵

Time (MST)	Observation
11:47:17	A flight attendant made a passenger announcement that indicated the main cabin door had been closed and they were preparing for departure.
11:48:28	The flight crew performed a before-engine start checklist.
11:48:41	The flight crew radioed the common traffic advisory frequency (CTAF) for HDN and reported they were pushing off the ramp intending to taxi to runway 10 for departure. PM: <i>"and hayden airport jetblue seventeen forty eight. we're pushing off the ramp for ten."</i>
11:48:46	Another inbound airplane to HDN, the Beechcraft Super 'King Air', radioed the CTAF and indicated they were descending out of 17,000 feet with intentions to land on runway 10 in about 9 minutes. KA-1: <i>"hayden yampa valley king air three five zero juliet. we're about nine uh...uh minutes out for uh ten. coming in from the east. descending out of seventeen thousand. three five zero juliet."</i>
11:49:04	A speaker, identifying themselves as HDN UNICOM, reported that multiple airplanes were inbound, and the wind was calm.⁶ UNI: <i>"three five zero juliet. hayden unicom we have multiple aircraft inbound. winds are calm. altimeter three zero three six."</i> KA-1: <i>"three zero three six. three five zero juliet."</i>
11:49:11	The PM discussed with the PF that multiple airplanes, including the King Air, were inbound and all were using runway 10.

⁵ In the table, [] denotes an editorial insertion, * denotes an unintelligible word, and # denotes and expletive.

⁶ At HDN, the CTAF and UNICOM frequencies were the same, 123.000 MHz.

Time (MST)	Observation
11:50:23	The PM radioed Denver center and reported they were on the ground at HDN preparing for engine start and would be ready for departure shortly. PM: <i>"denver jetblue seventeen forty eight on the ground hayden. starting engines. we'll be ready for our departure in about uh six or seven minutes."</i> The Denver center controller asked the flight crew if they were planning to depart on runway 10. CTR: <i>"jetblue seventeen forty eight and uh are you planning one zero?"</i> PM: <i>"affirmative."</i> The Denver center controller instructed the flight crew to radio him when they were ready at the departure end of runway 10. CTR: <i>"all right. just call me number one ready to go."</i> PM: <i>"wilco."</i>
11:50:53	The flight crew started engine 1. Sounds consistent with engine start were noted thereafter.
11:51:55	The King Air radioed Denver center, however, there was no response. KA-1: <i>"denver three five zero juliet."</i>
11:52:02	The flight crew started engine 2. Sounds consistent with engine start were noted thereafter.

Time (MST)	Observation
11:52:12	The King Air radioed Denver center again and indicated they were going to cancel their instrument flight rules (IFR) flight plan as they had visual contact with HDN. The King Air then also indicated they planned to land on runway 28 instead of runway 10. KA-1: "denver three five zero juliet." CTR: "five zero juliet go ahead." KA-1: "uhhh would it inconvenience you if we canceled and landed two eight? we can see the runway * * almost five hundred overcast." CTR: "it's up to you. if you want to cancel that's fine." KA-1: "all right. we're going to cancel right now and land two eight. hayden yampa valley." The Denver center controller acknowledged the King Air's IFR cancellation. CTR: "five zero juliet cancelation received. squawk V-F-R. frequency change approved. have a good day." KA-2: "squawk V-F-R. over to * * as well. five zero juliet good day. "
11:53:07	The King Air radioed the CTAF and stated they would be landing on runway 28. KA-1: "three five zero juliet's going to go ahead and land two eight. hayden yampa valley we're straight in. two eight right now."
11:53:18	The PM radioed the CTAF and stated they were leaving the ramp area and taxiing to runway 10 for departure. PM: "hayden yampa valley jetblue seventeen forty eight airbus coming off the ramp for runway one zero. hayden yampa valley."

Time (MST)	Observation
11:53:26	HDN UNICOM reported that multiple airplanes were inbound, and the wind was calm. UNI: <i>"jetblue seventeen forty eight hayden unicom we have multiple aircraft inbound. winds are currently calm. altimeter is three zero three six."</i> PM: <i>"roger. seventeen forty eight."</i>
11:53:42	The flight crew performed an after-start checklist.
11:53:45	The King Air radioed the CTAF and reported they were on a 12-mile straight-in final for runway 28. KA-1: <i>"three five zero juliet's uh...twelve mile final two eight straight in. hayden yampa valley."</i>
11:54:00	The flight crew discussed pre-departure activities: PM, "we're number one [for departure], do you want to do anything else first?" PF, "I think we're going to wait for these planes to come in." The flight crew performed a flight control free and clear check.

Time (MST)	Observation
11:54:25	The King Air radioed the CTAF and asked if anyone was about to depart from runway 10. KA-1: <i>"anybody about to depart uh ten at hayden?"</i> The PF replied on the CTAF that they intended to hold on the taxiway near the end of runway 10 and wait for a clearance from Denver center. PF: <i>"jetblue seventeen forty eight is uh...going to holding short of the runway. runway ten at the end of the runway waiting for our clearance."</i> The King Air replied on the CTAF that they were on a 10-mile straight in final for runway 28. KA-1: <i>"all right we're on a uh ten mile final two eight straight in."</i> PF: <i>"all right copy that. we'll keep an eye out for you."</i> KA-1: <i>"hayden yampa valley."</i> The flight crew discussed the King Air: PM, "all right so he's coming in right now."
11:54:48	The flight crew began the before-takeoff checklist. During the checklist, they verbalized speeds of 142 knots, 142 knots, and 143 knots.⁷

⁷ The flight crew did not verbalize the name of the speed they were referring to, however, data from the operator indicated the calculated takeoff speeds for the accident flight were V1 = 142 knots, VR = 142 knots, and V2 = 143 knots.

Time (MST)	Observation
11:55:20	The PM radioed Denver center and reported they were ready for departure on runway 10 at HDN. PM: "denver jetblue seventeen forty eight number one at runway one zero ready for departure." CTR: "jetblue ready at hayden understood?" PM: "affirmative. seventeen forty eight." The Denver center controller cleared the airplane to FLL as filed, with a 2-minute clearance void time. CTR: "jetblue seventeen forty eight cleared from hayden to uh fort lauderdale as filed. climb and maintain one three thousand. squawk zero six two two. released. clearance void if not off in two minutes." PM: "all right roger that fort lauderdale as filed. one three thousand. squawk zero six two two. uh off in two minutes. jetblue seventeen forty eight."
11:56:06	The flight crew performed a takeoff briefing and finished the before-takeoff checklist.
11:56:25	The PM radioed the CTAF and stated they had a clearance and would be taking off on runway 10. PM: "hayden traffic. jetblue seventeen forty eight uh released and we are taking off runway one zero."
11:56:30	The King Air radioed the CTAF and reported they were on final approach for runway 28 and they had been making position calls. KA-1: "uh hayden yampa valley uh you got uh a king air on final two eight. hayden yampa valley. we've been calling."

Time (MST)	Observation
11:56:37	The flight crew discussed the King Air's position: PF, "yeah but where is he at?" The PM radioed the CTAF and inquired about the King Air's current position. The King Air reported they were less than four miles from the airport. PM: "yeah I thought you guys were still like eight...nine miles out." KA-1: "four miles." KA-2: "less than that."
11:56:48	The PF stated to the PM: PF, "well we're taking off now." The PM radioed the CTAF and stated they were taking off on runway 10. PM: "and jetblue's on the roll. jetblue uh seventeen forty eight on the roll runway one zero hayden." KA-1: "all right we're on a short final. I hope you don't hit us."
11:57:02	Sounds similar to an increase in engine thrust were noted.
11:57:06	The PM verified the airspeed indicator was functional: PM, "airspeed's alive."
11:57:13	The flight crew discussed the position of the King Air: PM, "he's [the King Air] on two eight?" PF, "is he? oh #." PM, "eighty knots power set."

Time (MST)	Observation
11:57:19	The flight crew continued to discuss the King Air as the airplane was accelerating down the runway: PM, "yes he [the King Air] is on two eight. do you see him?" PF, "no."
11:57:23	The King Air radioed the CTAF and asked if the flight crew was going to make a quick turn after departure to avoid a collision. KA-1: "you guys do a quick uh turn out cause we're [cut off by another radio transmission]."
11:57:25	The flight crew stated the following: PF, "oh jesus christ." PM, "you're slow. airspeed. airspeed. airspeed. airspeed." Sounds similar to a tailstrike were noted immediately thereafter.
11:57:32	After takeoff, the flight crew discussed the sounds similar to a tailstrike: PM, "positive rate." PF, "what the # was that?" PM, "I think it- it may have been the tail."
11:57:39	The King Air made an unintelligible radio transmission on the CTAF.
11:57:40	The PM radioed the CTAF and indicated they were making a right turn. PM: "jetblue's making the turn" KA-1: "yup. thank you."

Time (MST)	Observation
11:57:51	The flight crew discussed the King Air: PF, "I thought he [the King Air] was on [runway] ten." PM, "I thought he [the King Air] was too."
11:58:04	The flight crew discussed the takeoff from HDN: PM, "you pulled- you pulled way early." PF, "yeah."
11:58:10	The PF informed the PM that they would write up the tailstrike in the logbook after they landed in FLL.
11:58:15	The Denver center controller radioed the flight crew and asked if they had departed HDN and, if so, their current altitude. The flight crew did not respond. CTR: "jetblue seventeen forty eight I believe you were checking in. say altitude leaving."
11:58:40	The King Air radioed Denver center. There was no response. KA-1: "denver center three five zero juliet."
11:59:10	The King Air radioed Denver center again. KA-1: "denver center king air three five zero juliet." CTR: "are you airborne or on the ground sir?" KA-1: "on the ground." CTR: "all right i'll get back to you in ten minutes."

Time (MST)	Observation
11:59:17	The flight crew radioed Denver center and reported they were off HDN and at an altitude of 10,100 feet climbing to 13,000 feet. PM: "jetblue seventeen forty eight uh ten one climbing to one three thousand off hayden." CTR: "jetblue seventeen forty eight denver center radar contact five miles southeast of the hayden airport maintain one three thousand * * inbound traffic." PM: "all right roger that maintain one three thousand jetblue seventeen forty eight." CTR: "jetblue seventeen forty eight traffic twelve o'clock eight miles westbound a hawker level at one four thousand." PM: "roger jetblue seventeen forty eight is looking."
11:59:51	The flight crew discussed if they had just experienced a tailstrike or something else, as they did not expect a tailstrike to feel so hard.
12:00:06	The flight crew had further discussion on how they thought the King Air was landing on runway 10, not runway 28. The PM indicated that he saw the King Air on the traffic alert and collision avoidance system (TCAS) as they were accelerating down the runway.
12:00:15	The flight crew performed an after-takeoff checklist.
12:00:19	The flight crew discussed how they thought the HDN UNICOM should have informed them that the King Air was inbound and landing on runway 28.

Time (MST)	Observation
12:01:37	The King Air radioed Denver center and informed them about the incident. The King Air indicated they had been making positioning calls on the CTAF since they were about 15 miles from the airport. CTR: <i>"three five zero juliet you ready to copy that clearance?"</i> KA-1: <i>"three five zero juliet i'm not calling for a clearance. i'll call you on the phone."</i> CTR: <i>"negative sir. clearance delivery is not active there. you looking for a clearance or not?"</i> KA-1: <i>"no but I need to talk to somebody at denver center."</i> CTR: <i>"what's your question?"</i> KA-1: <i>"uhhhh i don't have a question I have a comment uhhh that we had an airplane takeoff...the opposite runway and we had been calling about fifteen miles out that we'd be coming into two eight. so I don't know who's at fault there."</i> CTR: <i>[provided Denver center phone number]</i>
12:02:01	The flight crew discussed how they thought the King Air was on an IFR flight plan and the Denver center controller should have placed the King Air in a hold while they departed on runway 10.

Time (MST)	Observation
12:02:22	The Denver center controller cleared the airplane to FL230. CTR: <i>"jetblue seventeen forty eight climb and maintain flight level two three zero."</i> The PM asked the controller if he had a course for them yet. PM: <i>"flight level two three zero jetblue seventeen forty eight. you got a uh any word on course for us yet?"</i> CTR: <i>"uh you should already be on course sir. you're cleared as filed * *."</i> PM: <i>"sorry about that. we are on course now. jetblue seventeen forty eight."</i>
12:03:43	The PF called the flight attendants and asked them what they experienced during departure. One flight attendant said it felt like they hit the tail on the runway. They reported that it was a very hard impact and everything the customers had in their laps fell to the floor. Another flight attendant remarked that some customers were very worried and asked him [the PF] to make an announcement.
12:04:25	The flight crew checked in with a second Denver center controller and reported they were at 17,000 feet climbing to FL230. The Denver center controller cleared the airplane to FL260.
12:06:10	The PF radioed a maintenance controller at the operator. The PF and the maintenance controller discussed the hard impact on departure. The PF reported that they had no pressurization issues. The maintenance controller put the PF on hold to see if the airplane had logged any faults in the remote monitoring maintenance system.

Time (MST)	Observation
12:09:39	The flight crew checked in with a third Denver center controller and reported they were at FL260. The Denver center controller cleared the airplane to FL310. About two minutes later, the controller cleared the airplane to FL350.
12:11:35	The maintenance controller returned and recommended that they not continue to FLL and land so the airplane could be inspected for damage. The PF agreed and stated they would divert to Denver International Airport (DEN). The maintenance controller stated he would patch in a dispatcher to coordinate the diversion.
12:13:13	The flight crew radioed Denver center and asked to level off at an altitude of FL310.
12:15:14	The PF called the flight attendants to inform them of the diversion. The PF made an announcement to the passengers about the incident and diversion.
12:15:50	The flight crew radioed the Denver center controller and informed him that they would be diverting to DEN because of a maintenance issue. The controller asked if it was an emergency, and the flight crew responded that it was not an emergency. The controller responded that the airplane was cleared to DEN via radar vectors and to maintain FL310.

Time (MST)	Observation
12:17:48	The Denver center controller asked what specific maintenance issue the airplane had. The flight crew replied that they had a tailstrike on departure at HDN and they and their company thought it was best to divert to DEN and have the airplane inspected for damage.
12:18:55	The flight crew had another discussion describing how they thought the King Air was landing on runway 10, not runway 28.
12:22:21	The flight crew had the following discussion: PF, "this is one of those moments where like- you know- when- you got so much # going on ya know you're just seeing what you need to do you know to save yourself you know what I mean? and so you make- like you- you don't know like is this guy coming at me? is he on the downwind? ya know? so had- had we said reject-" PM, "I should've just- I should've just # said stop. I knew I- I put it all together like coming- I don't know how fast we were going but..." PF, "yeah well we were- that was the other problem we were like right there at V one. I just- I just reacted too quickly." PM, "yeah we were- we were slow. really slow." PF, "yeah I wanted to get off the ground ya know?"
12:23:01	The Denver center controller cleared the airplane to descend to FL270.
12:26:27	The Denver center controller cleared the airplane for the NIIXX THREE arrival procedure into DEN.
12:28:46	The flight crew checked in with a fourth Denver center controller and reported they were level at FL270 and direct NIIXX.

Time (MST)	Observation
12:28:52	The Denver center controller cleared the airplane to descend to FL190.
12:31:18	The flight crew checked in with a Denver approach controller and reported they were at FL201, descending to FL190.
12:31:32	The Denver approach controller told the flight crew to expect a visual approach to runway 35R at DEN.
12:31:53	The Denver approach controller cleared the airplane to descend to 13,000 feet.
12:32:49	The flight crew performed an approach briefing.
12:33:39	The flight crew performed an approach checklist.
12:37:14	The flight crew reported they had the runway in sight. The Denver approach controller cleared the airplane for the visual approach to runway 35R and a descent to 9,000 feet.
12:40:02	The flight crew checked in with the Denver tower controller and reported they were on the visual approach for runway 35R. The Denver tower controller cleared the airplane to land on runway 35R.
12:41:01	The flight crew performed a landing checklist.
12:42:14	Sounds consistent with landing gear touchdown were noted.

Time (MST)	Observation
12:46:30	After landing the flight crew had the following discussion: PF, "what I'd like to know is what the f-- that guy must've been I-F-R because there was- you remember how there was like that ceiling there too?" PM, "well he was making calls and I just- I don't- in my brain it was ten. ten. I was just thinking ten." PF, "yeah but there was also a layer." PM, "but there was a layer." PF, "I'm going to- I'm going to ask them then because that's # up if they cleared this guy in an I-L-S approach to two eight..." PM, "they don't even have an I-L-S it's an R-NAV. no I heard him- I think I heard him talk to * * when I was on the ramp asking for the R-NAV. so he was on the approach." PF, "yeah." PM, "so he hadn't been cleared V-F-R yet." PF, "yeah. yeah that's # up." PM, "and we were number one at the end. and then I'm like- where is on final...I don't see him? and I'm like okay we're rolling let's go because I'm thinking we gotta get out of his way so let's go."

Time (MST)	Observation
12:47:47	The flight crew continued the previous discussion: PM, "and I—the thing that aggravates me the most though is that I heard the guy coming in and my brain just kept thinking ten." PF, "yeah but that's normal. that's normal. that's what they call expectation bias because everyone is using ten." PM, "and then I switched up and I'm trying to get clearance and all this other stuff so I'm bouncing back and forth." PF, "yeah. yeah and [HDN] UNICOM- UNICOM didn't tell us anything." PM, "yeah he said multiple airplanes inbound." PF, "yeah and so we know that. everybody knows that. multiple planes outbound. ya know?" PM, "right and so I didn't think much of it. and I'm looking for the guy on final and I'm like I don't see him out here. but we-yeah." PF, "I mean obviously we—ya know..." PM, "stuff could've been done different." PF, "everything should've—" PM, "the whole series of events could've been different." PF, "yeah but that's all because it leads you down a path you know what I mean? Like A-T-C is leading us down a path. UNICOM is leading us down a path."
12:57:11	The recording ended.