

National Transportation Safety Board

Office of Research and Engineering

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COCKPIT VOICE RECORDER

Specialist's Factual Report

March 17, 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 group 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. INCIDENT

Location: Dayton, Ohio
Date: October 5, 2022
Time: 1900 eastern daylight time (EDT)
Airplane: Bombardier CL-600-2B19, Air Wisconsin 3818, N447AW

B. COCKPIT VOICE RECORDER SPECIALIST

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C. FEDERAL CARRIAGE REQUIREMENTS

The event aircraft, N447AW, was operating as Title 14 *Code of Federal Regulations* (CFR) Part 121. The event aircraft was operating such that it was required to 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: L3 FA2100
Part Number: 2100-1020-00
Recorder Serial Number: 000749472

1.0 Recorder Description

This model CVR, the L3 FA2100-1020, 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 position, one channel for a cockpit observer position, 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	Observer	Excellent	120 min
2	First Officer	Excellent	120 min
3	Captain	Excellent	120 min
4	Cockpit Area Microphone	Good	120 min

1.3 Timing and Correlation

Timing on the transcript was established by correlating the CVR events to common events on the flight data recorder (FDR). Specifically, the last four radio transmissions that the aircraft made during the flight and the time that the gear was extended were correlated to the radio transmit microphone key parameter and gear handle parameter from the FDR. Each of the four radio transmissions and gear extension acted as an anchor point for a linear interpolation between the remaining CVR events. Once a correlation between the two recorders was established, a reference to local time was determined. The CVR and FDR times were offset to reflect the local eastern daylight time of the accident.

1.4 Description of Audio Events

In agreement with the Investigator-In-Charge, a CVR group did not convene. A summary of events from the CVR beginning during the descent into Dayton follows.

The captain was the pilot flying and the first officer was the pilot monitoring and communicating on the radio. At 1848:30, the crew conducted the approach in-range checklist, and one minute later the captain conducted an approach briefing with the first officer. At 1849:27, the crew reported that they were passing through 10,000 feet.

At 1852:54, the crew was contacted by the approach controller. The first officer reported that they had the field in sight, and the controller cleared them for a visual approach into the airport for runway 24 left. Following the approach clearance, the captain called for the approach checklist, which was completed by the flight crew. At 1854:33, the approach controller again cleared the aircraft for a visual approach into runway 24 left and handed them off to the Dayton tower.

Checking in with Dayton tower at 1855:15, the first officer reported that they were 10 miles out from the airport. The tower controller cleared them to land on

¹ Appendix A comprises the CVR Quality Rating Scale.

runway 24 left. At 1855:28, the crew began to configure for landing, setting flaps with speed callouts. The landing gear was called for at 1856:16 and sounds consistent with the landing gear being lowered were audible. The first officer completed the landing checklist at 1856:59. Sound consistent with the autopilot disconnect tone was recorded and the pilot stated "autopilot off" at 1857:37.

Sounds consistent with the aircraft nose gear touching down on the runway uneventfully were recorded at 1858:55. About 6.5 seconds after the touchdown a brief rattling and then rumbling noise was recorded in the CAM channel. As the aircraft was slowing at 1859:03, the captain shouted, "woah, what the [expletive]!" About 5 seconds later, a sound of rumbling similar to departing the paved surface of the runway was recorded on the cockpit area microphone (CAM). No aural alerts were audible in the recording. At 1859:11, while the aircraft was still audibly decelerating, the first officer asked, "What happened?", and the captain replied, "I don't know what's going on."

The aircraft came to a stop at about 1859:15. The captain and first officer discussed the incident. The captain said, "I don't know what happened, was it the reverser?" The first officer said, "I didn't see anything it just lost control."

The flight crew communicated with the tower, passengers via the intercom and the flight attendant, and speculated on what could have caused the incident. At 1905:35, a fire truck arrived and began performing visual inspections, and at 1906:39 the engines were shut down.

Passengers began to disembark the aircraft at 1942:01, and the recording ended at 2010:15.

Submitted by:

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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.