

**NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, D.C. 20594**



SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

CEN20LA028

**By
Michael Portman**

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 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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October 30, 2020

Cockpit Voice Recorder

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1. EVENT SUMMARY

Location: Detroit, MI
Date: December 3, 2019
Aircraft: BAE 125 800A, Registration N469RJ
Operator: Business Jet Managers Inc.
NTSB Number: CEN20LA028

On December 3, 2019, about 0833 eastern standard time, a BAE 125 800A airplane, N469RJ, impacted terrain during an instrument landing system (ILS) approach to runway 33 at the Coleman A. Young Municipal Airport (DET), near Detroit, Michigan. The airline transport pilot and copilot were uninjured, and the airplane's right wing sustained substantial damage. The airplane was registered to and operated by Business Jet Managers Inc. as a Title 14 *Code of Federal Regulations* Part 91 repositioning flight for a subsequent Part 135 flight. Day visual meteorological conditions prevailed in the area about the time of the accident, and the flight was operated on an instrument flight rules flight plan. The flight originated from the Willow Run Airport (YIP), near Detroit, Michigan, about 0819, and was destined for DET. A tape cockpit voice recorder (CVR) was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for evaluation.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model: **Fairchild A-100A**
Recorder Serial Number: **58758**

3.1 CVR Carriage Requirements

Per federal regulation, turbine multiengine aircraft with six or more passenger seats and requiring two pilots manufactured prior to April 7, 2010, and operated under 14 CFR 91 or 135, must be equipped with a CVR that records a minimum of the last 30 minutes of aircraft operation; this is accomplished by recording over the oldest audio data. The accident aircraft was manufactured in 1986. When the CVR is deactivated or removed from the airplane, it retains only the most recent 30 minutes of CVR operation.

3.2 Recorder Description

This model CVR, the Fairchild A-100A, records a minimum of 30 minutes of analog audio on a continuous loop tape in a four-channel format: one channel for each flight crew, one channel for a cockpit observer, and one channel for the cockpit area microphone (CAM).

3.3 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.

3.4 Audio Recording Description

Each channel's audio quality is indicated in Table 1.¹ Channel number four did not contain any audio information (nor was it required by federal regulations).

Table 1. Audio Quality.			
Channel Number	Content/Source	Quality	Duration
1	Crew Audio Panel	Fair	31 minutes, 3 seconds
2	Crew Audio Panel	Good	31 minutes, 3 seconds
3	CAM	Good	31 minutes, 3 seconds
4	Cockpit Observer	N/A	31 minutes, 3 seconds

3.5 Timing and Correlation

Due to the lack of an onboard flight data recorder or sufficient ATC data, a correlation between CVR elapsed time and local time could not be established. Therefore, the CVR events were not offset and are shown in CVR elapsed time denoted in hh:mm:ss where "hh" is hours, "mm" is minutes, and "ss" is seconds.

3.6 Description of Audio Events

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

The first approximately 5 minutes and 29 seconds of the recording captured the previous flight into Willow Run airport. The aircraft landed and taxied to parking uneventfully.

The incident flight began recording at 00:05:29.

At 00:05:45, the crew received the Willow Run airport ATIS as follows: Information Mike, published at 1253 Zulu. Winds from 240 degrees at 4 knots, visibility ten statute miles, ceiling 900 feet broken and 1,800 feet overcast, temperature -1 degrees Celsius, dewpoint -3 degrees Celsius, and an altimeter setting of 29.87 inches of mercury. Additional remarks included a notice for bird and wildlife activity in the vicinity of the airport.

¹ See attached CVR Quality Rating Scale.

At 00:07:41, the crew received their IFR clearance to Detroit City as filed. They were instructed to maintain 3,000 feet, upon departure contact 118.95 and squawk 5206. The flight crew correctly read back their clearance.

At 00:09:34, the crew requested and received a taxi clearance to runway 23R.

At 00:09:56, ATC informed both the accident aircraft and the preceding aircraft of numerous arrival PIREPs indicating moderate rime icing for the last three hours.

At 00:10:10, the flight crew completed a before takeoff checklist, including setting flaps to 15, shutting the airbrakes, setting trim, and posting speeds.

At 00:12:31, the captain mentioned he will prime the TKS ice protection system.

At 00:12:58, the flight crew called ATC holding short of runway 23R, ready for departure.

At 00:13:21, the flight was cleared for takeoff on runway 23R, and the takeoff proceeded uneventfully shortly thereafter.

At 00:14:38, the flight was handed over to departure. The crew checked in to departure shortly thereafter and were cleared to turn right to a heading of 360 degrees and to climb and maintain 5,000 feet.

At 00:15:48, the flight crew received a turn to 90 degrees.

At 00:16:01, the crew obtained the Detroit City weather report as follows: Information Mike, wind reported as 270 degrees at 10 knots, visibility ten statute miles, with a ceiling of 1,100 feet overcast; temperature -1 degrees Celsius, and dewpoint -3 degrees Celsius, ILS runway 33 in use, with remarks including the PAPI being out of service.

At 00:18:31, the flight received a turn to 120 degrees.

At 00:21:36, the flight was instructed by ATC to descend to 3,000 feet and turn to 90 degrees.

At 00:23:42, the first officer remarked that ice was forming on "this side quite a bit."

At 00:24:05, the flight received a turn to 70 degrees.

At 00:24:47, the flight received a turn to 360 degrees to intercept the localizer to runway 33.

At 00:25:54, the flight was cleared for the ILS runway 33.

At 00:26:09, the captain reported the glide slope is alive.

At 00:26:23, the flight was handed over to the tower.

At 00:26:40, the flight was cleared to land runway 33, with a wind update of 260 degrees at 12 knots. At this time, an increase in ambient noise, consistent with gear coming down, was heard.

At 00:28:22, the first officer remarked that there was ground visibility out the side of the aircraft, but not the front.

At 00:28:34, the first officer remarked that he could see the runway, and the captain called for flaps full.

At 00:28:51, the first officer performed a before landing checklist, including flaps full indicated, three green and a pin, and wheels centered.

At 00:28:58, the crew called into the tower that they broke out of the clouds at about 1,500 feet.

At 00:29:02, an automated obstacle warning sounded, and was acknowledged by the captain.

At 00:29:12, a wind update was provided of 270 degrees at 10 knots gusting to 15 knots.

At 00:29:42, an unidentified approximately 1,735 Hz whistle tone was heard for approximately 2.6 seconds.

At 00:29:44, sounds of scraping were heard.

At 00:29:45, sounds similar to impact were heard.

At 00:30:06, the flight crew discussed having stalled.

At 00:30:26, the first officer called ATC to inform them they are okay.

The recording ended shortly thereafter at 00:31:04.

Attachment I

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.