

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



SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

CEN19LA039

**By
Joe Gregor**

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.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

June 18, 2019

Cockpit Voice Recorder

Specialist's Factual Report
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1. EVENT SUMMARY

Location: Fargo, ND
Date: November 30, 2018
Aircraft: Cessna 550, Registration N941JM
Operator: Dirt Dynamics, Inc
NTSB Number: CEN19LA039

On November 30, 2018, about 1353 central standard time, a Cessna 550, N941JM, departed controlled flight while on approach at the Hector International Airport (FAR), Fargo, North Dakota, and impacted the terrain to the right of the runway. The pilot and one passenger were not injured, and 9 passengers received minor injuries. The airplane sustained substantial damage. The airplane was registered to the Slice of the 406 LLC and operated by Dirt Dynamics, Inc. under the provisions of the Title 14 *Code of Federal Regulations* Part 91 as a business flight. 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 GA-100**
Recorder Serial Number: **02281**

3.1 CVR Carriage Requirements

Per federal regulation, multiengine turbine powered aircraft with more than six passenger seats and requiring two pilots manufactured prior to April 7, 2010 and operated under 14 *Code of Federal Regulation* (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 1980. 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 GA-100, is designed to record 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 significant heat or structural damage and the audio information was extracted from the recorder normally, without difficulty. The magnetic tape was retrieved from within the crash-protected case and was successfully read out using a NAGRA-TI reel-to-reel instrumentation tape player.

3.4 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	First Officer position (FO)	Good	27:05 (min:sec)
2	Captain position (CAPT)	Good	27:05 (min:sec)
3	Cockpit Area Microphone (CAM)	Good	27:05 (min:sec)
4	Jump seat position	Good	27:05 (min:sec)

3.5 Timing and Correlation

Timing on the transcript is in elapsed time from the beginning of the recording.

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 recording began with the aircraft in-flight. Approximately 5:13 (m:ss) into the recording, the flight was transferred to Fargo approach control and reported descending through 13,600 feet for 8000 feet with ATIS² information echo. Approximately 10:05 (mm:ss) into the recording, the flight was cleared to descend to 3000 feet and a PIREP³ was requested for, "bottoms, tops, and icing." The CVR then recorded sounds consistent with the pilot setting up the flight instruments for an approach. At 12:41 (mm:ss), the CVR recorded a 2600 Hz warning tone. At 16:50 (mm:ss), the flight was cleared for the ILS approach to Runway 18. Approximately two minutes later, the CVR recorded a voice stating, "ah it's thick, moisture" and the CAPT responding, "it's thick, yes sir." Approximately 19:43 (mm:ss) into the recording, the flight was instructed to switch to tower frequency and subsequently cleared to land on runway 18. Approximately 45

¹ See attached CVR Quality Rating Scale.

² Automated Terminal Information Service

³ A PIREP is a pilot report on conditions experienced during certain phases of the flight.

seconds thereafter, the CVR recorded sound consistent with landing gear extension and a voice stating, "all green." The CAPT responded, "check, check, check," followed by "outer marker, four miles." At 21:12 (mm:ss), the CVR recorded another 2600 Hz warning tone. Approximately 80 seconds thereafter, the CVR recorded a voice stating, "kicked it *⁴ to high, huh?" and the CAPT responded, "yup." At 22:46 (mm:ss) the CVR recorded a voice stating, "jeeze it's low," and the CAPT responding, "yup, we're almost there." At 23:09 (mm:ss), the CAPT announced he had the runway in sight and the CVR recorded a 4300 Hz warning tone. Approximately 20 seconds thereafter, the pilot stated, "oh, oh man," and the CAM recorded sounds consistent with increasing engine noise. Approximately 3 seconds thereafter, the CAM recorded sounds consistent with ground contact. At 23:49 (mm:ss) the CVR recorded a 925 Hz warning tone, followed by the captain asking if everyone in the aircraft was okay. Approximately 23 seconds later, the CAPT contacted tower and was informed that fire/rescue trucks were on their way.

The recording ended at 27:05 (mm:ss) elapsed time.

⁴ Unintelligible word.

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.