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

SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

ERA15LA288

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.

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May 16, 2016

Cockpit Voice Recorder

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1. EVENT SUMMARY

Location:	West Palm Beach, Florida
Date:	July 22, 2015
Aircraft:	Bombardier CL-600-2B16, Registration N613PJ
Operator:	USAC Airways 691 LLC
NTSB Number:	ERA15LA288

On July 22, 2015, about 1410 eastern daylight time, a Canadair CL-600-2B16, N613PJ, operated by USAC Airways 691 LLC, was substantially damaged when it struck an all-terrain ground vehicle (ATV) while taxiing at Palm Beach International Airport (PBI), West Palm Beach, Florida. Both airline transport pilots were not injured. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the flight, which was destined for Opa-Locka Executive Airport (OPF), Miami, Florida. The positioning flight was operated under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91. 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:	**60396**

3.1 CVR Carriage Requirements

Per federal regulation, multiengine aircraft with more than six passenger seats and requiring two pilots manufactured prior to April 7, 2010, and operated under 14 CFR 91, 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 1992. When the CVR is deactivated or removed from the airplane, it retains only the most recent 30 minutes of recorded information.

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, by removing the tape from the crash protection housing and reading out the analog audio information using an industrial-grade reel-to-reel tape player. The analog audio was digitized using industry-standard audio recording software.

3.4 Audio Recording Description

Each channel's audio quality[1] is indicated in Table 1. Channel number three did not contain any audio information (nor was it required by federal regulations).

Table 1: Audio Quality.

Channel Number	Content/Source	Quality	Duration
1	Captain (CAPT)	Fair	30 min
2	CAM	Fair	30 min
3	Other	n/a	30 min
4	First Officer (FO)	Fair	30 min

3.5 Timing and Correlation

Timing for the summary was established by correlating events recorded on the CVR to common events recorded on the flight data recorder (FDR). Specifically, six radio transmissions made from the aircraft made were correlated to the radio transmit microphone key parameter recorded on the FDR. Each of the six radio transmissions acted as an anchor point for a linear interpolation that provided a unique conversion from elapsed time on the CVR to the subframe reference number[2] (SRN) recorded on the FDR. In particular, 96879.1 SRN equates to 00:13:11.3 [h:m:s] elapsed time on the CVR. All times are expressed as SRN in this report.

3.6 Description of Audio Events

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

[1] See attached CVR Quality Rating Scale.

[2] Subframe reference number (SRN) measures elapsed time in seconds from an arbitrary, recorder specific, starting point.

The recording started at 96157 SRN with sounds consistent with an aircraft on the ground. After approximately 8 minutes, the CVR recorded sounds consistent with the captain entering the cockpit, followed by a recorded voice announcing ATIS[3] information zulu. At 96812 SRN, the crew discussed the disposition of the flight plan paperwork, followed approximately one minute later by a radio call to clearance delivery. The flight was then given a clearance to Opa-locka via the Palm Beach Seven Departure. At 96940 SRN, the first officer initiated the second and final read back of the clearance. At 97020 SRN, the crew entered a conversation consistent with programming of the flight management system (FMS).

At 97190 SRN, the captain noted a split elevator indication and exited the cockpit to examine the elevator response to control inputs. At 97357 SRN, the captain announced that the door was closed and asked, "you wanna fly left seat?" Approximately one minute later, the first officer replied, "you know what, yeah I do wanna fly left seat." The CVR then recorded sounds and crew conversation consistent with informal checklist usage along with a departure briefing.

At 97741 SRN, the CVR recorded sounds consistent with the starting of both engines. At 97810 SRN, the captain stated, "baggage door… I'll go get it." Approximately 20 seconds later, the CVR recorded sounds consistent with switch manipulation.

At 97856 SRN, the captain asked, "what are you doing?" Approximately ½ second later, the CVR recorded the sound of a warning or alert tone as the captain stated, "no brakes. what are you doing?" The first officer responded, "ah I didn't do anything. what's going on? what is going on? stop." And the captain replied, "I don't know." At 97864 SRN the CVR recorded sounds consistent with the engines winding down, followed approximately one second later by a sound consist with collision.

At 97868 SRN the first officer asked, "what happened?" The captain responded, "I don't know," followed by, "get outta that seat." The recording ended at 97871 SRN.

[3] Automatic Terminal Information Service.

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.