

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



SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

DCA19LA070

**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
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October 28, 2019

Cockpit Voice Recorder

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1. EVENT SUMMARY

Location: Tuscaloosa, Alabama
Date: January 28, 2019
Aircraft: Boeing 727-200, Registration N720CK
Operator: Kalitta Charters
NTSB Number: DCA19LA070

On January 28, 2019, about 2205 Central Standard Time (CST), a Boeing 727-200, N720CK, landed nose-gear up at the Tuscaloosa Regional Airport, Tuscaloosa, Alabama. The airplane sustained minor damage. The airplane was operated by Kalitta Charters under the provisions of the Title 14 *Code of Federal Regulations* Part 121. A solid-state 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: **L-3 Communications FA2100-1020**
Recorder Serial Number: **000160189**

3.1 CVR Carriage Requirements

The accident aircraft was manufactured in 1977. Per federal regulation, multiengine turbine-powered aircraft with six or more passenger seats and requiring two pilots manufactured prior to April 7, 2010 and operated under 14 *Code of Federal Regulation* (CFR) 121 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. When the CVR is deactivated or removed from the airplane, it will retain only the most recent period of CVR operation.

3.2 Recorder Description

This model CVR, L-3 FA2100-2010, is designed to record a minimum of 2 hours of audio in solid state memory. Specifically, it contains one 2-channel recording of the last 120 minutes of operation and a separate 4-channel recording of the last 30 minutes of operation. The 120 minute portion of the recording is comprised of one channel that combines all three audio panels sources and a second channel that contains the cockpit area microphone (CAM) source. The 30 minute portion of the recording contains 4 channels of audio information: one channel for each flight crew, one channel for the cockpit observer position, and one channel for the 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.

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	Combined	Good	120 min
2	CAM	Fair to Good	120 min
1	Captain (CAPT)	Good	30 min
2	First Officer (FO)	Good	30 min
3	CAM	Good	30 min
4	Other	Good	30 min

The event was captured near the beginning of the two hour recording on channels 1 and 2. While the recording in general was good, the Combined channel only contained radio reception and radio calls and no HOT microphone information. The CAM channel did pick up inter-cockpit speech, but at a much lower level than radio reception that was consistent with cockpit speaker audio.

3.5 Timing and Correlation

Timing on the transcript was established by correlating the CVR events to common events on the flight data recorder (FDR). Specifically, four radio transmissions made by the aircraft were correlated to the radio transmit microphone key parameter recorded by the FDR. Each radio transmission acted as an anchor point for a linear interpolation between the remaining CVR events. Timing in the transcript is given in terms of FDR Subframe Reference Number (SRN) to allow for ease in correlating the events described in these two reports.

¹ See attached CVR Quality Rating Scale.

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 at approximately 8242 SRN with the aircraft in-flight. Approximately three seconds later, the flight was cleared down to 7000 feet. At about 8294 SRN, the pilot flying stated that he had briefed a runway 32 approach with speeds of 131, 134, and 139. At about 8408 SRN, the pilot flying briefed a runway 4 approach, and the flight was given an altimeter setting of 29.93 by ATC. At about 8597 SRN, the flight was given a wind report at Tuscaloosa of 200 degrees at 4 knots and cleared down to 3000 feet. Approximately 1-1/2 minutes later, the pilot flying called for the approach checklist.

At 8755 SRN, the pilot not flying radioed that they had the runway in-sight, and the flight was cleared for a visual approach to runway 4. At 8770 SRN, the pilot flying called for flaps 5, followed 17 seconds later by a call for flaps 15. At 8801 SRN, the pilot flying stated, “the gear * * * down,”² and the pilot flying responded, “yeah it’s down, but * the lights *.” Ten seconds later the pilot flying called for flaps 30 and the pilot not flying acknowledged flaps 30. At 8819 SRN, the CVR recorded the sound of a warning horn which lasted 27 seconds. The pilot flying then queried, “* what horn was that?” and the pilot not flying responded, “* * gear warning horn.” At 8853 SRN, the CVR recorded a discussion concerning “...lights...” followed about 6 seconds later by sounds consistent with multiple rapid transmit key clicks. About 6-1/2 seconds later, the CVR recorded multiple automated “sink rate, pull up” warnings and the pilot flying responded, “yeah, yeah, I got it.” The pilot not-flying then queried, “you gonna go around?”, and the pilot flying responded, “ah I’m gonna go... I got, it, I got it.”

At 8892 SRN, the CVR recorded sounds consistent with the aircraft touching down on the runway. About eleven seconds later, at 8904 SRN, the CVR recorded the pilots saying, “no, no, no...”, followed 4 seconds later by a loud continuous broadband noise and sounds consistent with a warning horn. At about 8932 SRN, the pilot flying stated, “it wasn’t down,” and the pilot not-flying made a radio call to tower. About five seconds later the pilot not-flying stated, “shoulda gone around,” and the pilot flying responded, “yeah, shoulda.” At 8984 SRN, the pilot flying queried, “didn’t they fix that last night or what?” and the pilot not flying responded, “it was, it hasn’t been an issue, they cycled the gear and it came back on, they said they cycled the gear and it came back on.”

At 8990 SRN, the pilot flying stated, “go onto APU...” and the CVR recorded sounds consistent with a power transition. The remainder of the recording contained sounds consistent with the aircraft on the ground post-accident, including running of the starting engines checklist, the aircraft taxiing, and running of the parking checklist. The recording ended at 15647 SRN.

² An * indicates a word or words that were unintelligible.

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.