

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



**GROUP CHAIR'S FACTUAL REPORT OF INVESTIGATION**

**DCA22FA132**

**By  
Sean Payne**

**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 8, 2023

# Cockpit Voice Recorder

## Group Chairman's Factual Report By Sean Payne

### 1. EVENT SUMMARY

Location: Miami, FL  
Date: June 21, 2022  
Aircraft: MD-82, Registration HI-1064  
Operator: RED Air, Flight 203  
NTSB Number: DCA22FA132

A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for evaluation. The CVR group meeting convened on September 8, 2022, and a summary was prepared.

### 2. GROUP

Chair: Sean Payne  
Sr. Engineer  
NTSB

Member: John O'Callaghan  
Sr. Engineer  
NTSB

Member: John Lovell  
Sr. Investigator  
NTSB

### 3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model: **L3/Fairchild FA2100-1020**  
Recorder Serial Number: **142748**

### 3.1 CVR Carriage Requirements

Aircraft operated under 14 *Code of Federal Regulations* part 129 are required to follow the operating rules of their country of registry. ICAO Annex 6 Standards and Recommended Practices require that aircraft over 27,000 kilograms should 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.

### 3.2 Recorder Description

This model CVR, L3/Fairchild FA2100-1020, is a solid state CVR that records 120 minutes of digital audio. Specifically, it contains a 2-channel recording of the last 120 minutes of operation and separately contains 4-channel recording of the last 30 minutes of operation. The 120-minute portion of the recording is comprised of one channel that combines 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 a cockpit observer, and one channel for the 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.<sup>1</sup>

**Table 1:** Audio Quality for the 30-minute portion of the recording.

Channel Number	Content/Source	Quality	Duration
1	Jumpseat	Unusable	00:31:03.6
2	Capt. or First Officer (Unknown)	Unusable	00:31:03.6
3	Capt. or First Officer (Unknown)	Unusable	00:31:03.6
4	Cockpit Area Mic (CAM)	Poor	00:31:03.6

### 3.5 Timing and Correlation

The flight data recorder did not record a time parameter for UTC. The flight data recorder time in the Flight Data Recorder - Specialist's Factual report is given as subframe reference number (SRN). The CVR was matched to the FDR data using the following equation:

$$\text{CVR Time} + 171,565.1 = \text{FDR SRN}$$

All times in this report have been converted to SRN.

<sup>1</sup> See attached CVR Quality Rating Scale.

### **3.6 Description of Audio Events**

A CVR group was convened and consisted of the group chair, and two NTSB investigators who were fluent in Spanish. The audio from channel 1, the jumpseat, did not contain an obvious audio signal, and was unusable. The audio from channels 2 and 3 (associated with either the captain or the first officer's channel), contained only VHF radio communications. For this reason, channels 2 and 3 were considered unusable. The audio from channel 4 (CAM channel), captured extremely faint sounds of both the cockpit environment and the flight crew's intra-cockpit communications. Some cockpit environment sounds were audible, such as the aircraft's auto-voice feature, and some other flight deck sounds, such as an alarm consistent with the aircraft's altitude alerter. The flight crew's intra-cockpit communications, when detected, were consistent with being spoken in Spanish. These intra-cockpit communications were largely unintelligible. Where possible, these have been entered into the CAM channel in the transcript below.

A variety of digital filters were applied to the recording of channel 4. No digital filtering scheme was identified that markedly increased the intelligibility of the recording. The content from channel 4 was considered of poor quality.

A transcript comprised of sporadic crew comments, cockpit sounds, and auto voice information is appended below.

Prepared by,

Sean Payne  
Sr. Engineer  
NTSB

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
171565.1	<b>START OF RECORDING START OF TRANSCRIPT</b>		
172930.0	[Sound of buzzing alert.]		
<b>CAM</b>			
		173063.2	
		<b>CAPT- RDO?</b>	* * * (mile to flying approach that gunna) * * * .
		173067.4	
		<b>APP</b>	two zero three cleared ILS runway nine.
		173069.9	
		<b>CAPT- RDO?</b>	cleared ILS runway nine.
173069.9	[2500 feet automated voice callout.]		
<b>CAM</b>			
		173183.3	
		<b>APP</b>	two zero three contact tower one two three point nine.
		173185.3	
		<b>CAPT- RDO?</b>	one two three (point) nine.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		173221.8 TWR	cleared to land runway zero niner * * * three.
173265.8 CAM	[Sound of buzzing alarm and 1000 feet automated voice callout.]		
173308.6 CAM	[Sound of 500 feet automated voice callout.]		
173340.3 CAM	[sound of 100 feet automated voice callout.]		
173346.2 CAM	[Sound of 50 feet automated voice callout.]		
173347.4 CAM	[Sound of 40 feet automated voice callout.]		
173348.5 CAM	[Sound of 30 feet automated voice callout.]		
173349.8 CAM	[Sound of 20 feet automated voice callout.]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
173352.3 <b>CAM</b>	[Sound of 10 feet automated voice callout.]		
173357.2 <b>CAM</b>	[Sound of mechanical squeal.]		
173358.0 <b>CAM</b>	[Sound of light thunk.]		
173361.1 <b>CAM</b>	[Sound of second light thunk.]		
173363.1 <b>CAM</b>	[Sound of increasing shimmy and vibration increasing in frequency. Sound similar to sliding began.]		
173367.4 <b>CAM</b>	[First instance of auto voice system stating "landing gear."]		
173393.1 <b>CAM</b>	[Sound of loud thuds.]		
173399.4 <b>CAM</b>	[Cessation of sound similar to aircraft sliding across ground.]		
173428.7 <b>END OF TRANSCRIPT</b> <b>END OF RECORDING</b>			

## **Attachment I**

### **CVR Quality Rating Scale**

The levels of recording quality are characterized by the following traits of the cockpit voice recorder information:

- |                          |   |
|--------------------------|---|
| <b>Excellent Quality</b> | 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.   |
| <b>Good Quality</b>      | 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.  |
| <b>Fair Quality</b>      | 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.  |
| <b>Poor Quality</b>      | 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. |
| <b>Unusable</b>          | 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.   |