

National Transportation Safety Board

Office of Research and Engineering

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COCKPIT VOICE RECORDER

Specialist's Factual Report

November 1, 2022

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 National Transportation Safety Board 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.

A. ACCIDENT

Location: Jacksonville, Florida
Date: December 16, 2020
Time: 1419 eastern standard time (EST)
Airplane: Executive Aviation Investors Inc, Embraer EMB-500, N661EP

B. COCKPIT VOICE RECORDER SPECIALIST

Specialist Michael Portman
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C. FEDERAL CARRIAGE REQUIREMENTS

The event aircraft, N661EP, was operating as Title 14 *Code of Federal Regulations* (CFR) Part 91. The event aircraft was operating such that it was not required to be equipped with a cockpit voice recorder (CVR).

D. DETAILS OF THE INVESTIGATION

A CVR group was not convened. The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model: L3 FA2100-3083
Part Number: 2100-3083-50
Recorder Serial Number: 000604266

1.0 Recorder Description

This model CVR, the L3 FA2100-3083, records a minimum of 120 minutes of digital audio stored on solid state memory modules. Four channels are recorded: one channel for each flight crew, one channel for a cockpit observer, and one channel for the cockpit area microphone (CAM).

1.1 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.

1.2 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 (hh:mm:ss)
1	Captain	Good	02:04:14
2	First Officer	Good	02:04:14
3	CAM	Good	02:04:14
4	Unused	N/A	02:04:14

1.3 Timing and Correlation

Timing on the summary was established by correlating the CVR events to common events on the flight data recorder (FDR). Specifically, the last six radio transmissions that the aircraft made were correlated to the radio transmit microphone key parameter from the FDR. Each of the six radio transmissions acted as an anchor point for a linear interpolation between the remaining CVR events. Once a correlation between the two recorders was established, a reference to local time was determined. The CVR and FDR times were offset to reflect the local eastern standard time of the accident.

1.4 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. Large portions of the CVR content were in Spanish, and translation assistance was provided by Spanish speaking NTSB investigators.

Table 2. CVR Audio Observations.

Time EST (hhmm:ss.s)	Observation
1218:02.5	Beginning of recording.
1256:48.8	The crew requested flight following from ATC to Jacksonville Executive at Craig Airport (CRG), requesting to fly at 15,500 feet.
1304:15.9	Sounds consistent with engine start.

¹ Appendix A comprises the CVR Quality Rating Scale.

Time EST (hhmm:ss.s)	Observation
1306:25.2	The crew performed an after-start checklist.
1308:00.5	The crew called for and received taxi instructions.
1309:52.2	The crew discussed roles for the flight and discussed their route of flight. The pilot flying mentioned it has been a while since they flew visual or with flight following, so requested the pilot monitoring to back him up.
1311:16.8	An auto "takeoff ok" enunciation was heard.
1311:19.5	The crew further discussed the route, including discussion about how to avoid a nearby class B airspace.
1314:01.2	The crew called holding short of runway 9L.
1316:31.7	The flight was cleared for takeoff 9L on a straight-out departure.
1317:21.2	An increase in ambient noise was noted, consistent with applying takeoff power.
1318:00.3	Shortly after the gear-up call, a short vibration sound was noted.
1332:03.8	The crew called ATC for and subsequently received an IFR clearance.
1348:25.6	The crew were advised to contact Jacksonville Center and were advised of moderate to heavy precipitation in the area.

Time EST (hhmm:ss.s)	Observation
1355:17.7	The crew obtained CRG ATIS information Kilo issued at 1853 UTC, including winds from 100 degrees at 4 knots, visibility of ¾ mile, thunderstorms in the vicinity with heavy rain and mist, few clouds at 300 feet and an overcast ceiling at 4,000 feet, temperature 12 degrees Celsius, dewpoint 11 degrees Celsius, altimeter setting 29.88 inHg, with the ILS runway 32 approach in use.
1357:57.9	The crew conducted a standard approach briefing.
1401:55.7	The crew were instructed to contact approach.
1407:25.3	The flight was cleared down to 3,000 feet.
1407:49.0	Precipitation sounds were noted.
1408:15.4	The flight was cleared direct to JEVAG.
1411:13.5	ATC asked the crew if they want to try the approach or hold due heavy precipitation over the airfield. The crew confirmed their decision to try the approach.
1411:28.9	The flight was cleared for the ILS runway 32 approach.
1412:30.7	The flight was handed to CRG tower.
1412:55.2	The flight was cleared to land on runway 32 with winds from 290 degrees at 4 knots.
1413:12.2	CRG tower provided new weather information with a broken cloud layer at 300 feet.

Time EST (hhmm:ss.s)	Observation
1413:22.2	The crew decided to continue the approach.
1413:36.9	Sounds consistent with increased engine thrust were noted.
1414:09.2	The crew confirmed gear down three green, and confirmed they were continuing the approach.
1414:32.6	The crew called out glideslope captured.
1415:37.8	The crew made a 1000 established callout.
1416:00.4	The crew made a 900 foot callout.
1416:19.6	The crew made a 500 to minimums callout.
1416:28.4	The crew made a 400 to minimums callout.
1416:35.7	The crew made a 300 to minimums callout.
1416:39.0	500 automated callout.
1416:44.4	The crew made a 200 to minimums callout.
1416:48.9	The crew noted they were looking outside.
1416:51.5	The crew made a 100 to minimums callout.

Time EST (hhmm:ss.s)	Observation
1417:01.4	Minimums callout, the crew decided to continue.
1417:09.8	Autopilot disconnect sounds were noted.
1417:28.7	Sounds consistent with touchdown were noted.
1417:39.4	The crew called out for brakes, stating that the brakes aren't working.
1417:44.0	A CAS chime was noted.
1417:48.2	Rumbling sounds followed by sounds consistent with departure from the paved surface were noted.
1422:16.5	End of recording

Submitted by:

Michael Portman
Aerospace Engineer - Recorder Specialist

APPENDIX A. 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.