National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594

ANC23FA008

COCKPIT VOICE RECORDER

Specialist's Factual Report

March 22, 2023

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:	Kaupo, Hawaii
Date:	December 15, 2022
Time:	2114 Hawaii standard time (HST) 0714 December 16, 2022, coordinated universal time (UTC)
Airplane:	Guardian Flight LLC, Raytheon C90A, N13GZ

B. COCKPIT VOICE RECORDER SPECIALIST

Specialist	Michael Portman Aerospace Engineer – Recorder Specialist National Transportation Safety Board (NTSB)

C. FEDERAL CARRIAGE REQUIREMENTS

This flight was operated under Title 14 *Code of Federal Regulations* (CFR) Part 91 and 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:	Fairchild/L3 A-100S
Part Number:	S100-0080-00
Recorder Serial Number:	02761

1.0 Recorder Description

This model CVR, the Fairchild/L3 A-100S, records a minimum of 30 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

The CVR was submerged in approximately 6,500 feet of seawater for approximately one month. The CVR arrived at the laboratory in distilled water and appeared to have minor structural damage (see figure 1). The outer case was removed, and the interior crash-protected case did not appear to have any heat or structural damage, although some minor corrosion was noted. The memory board within the crash–protected case was checked for heat damage, structural damage,

and corrosion, and none was readily apparent (see figure 2). The memory board was immersed in reverse osmosis deionized water to be cleaned, and digital audio was successfully downloaded using laboratory techniques.

Figure 1. The L3 A-100S CVR, as received.

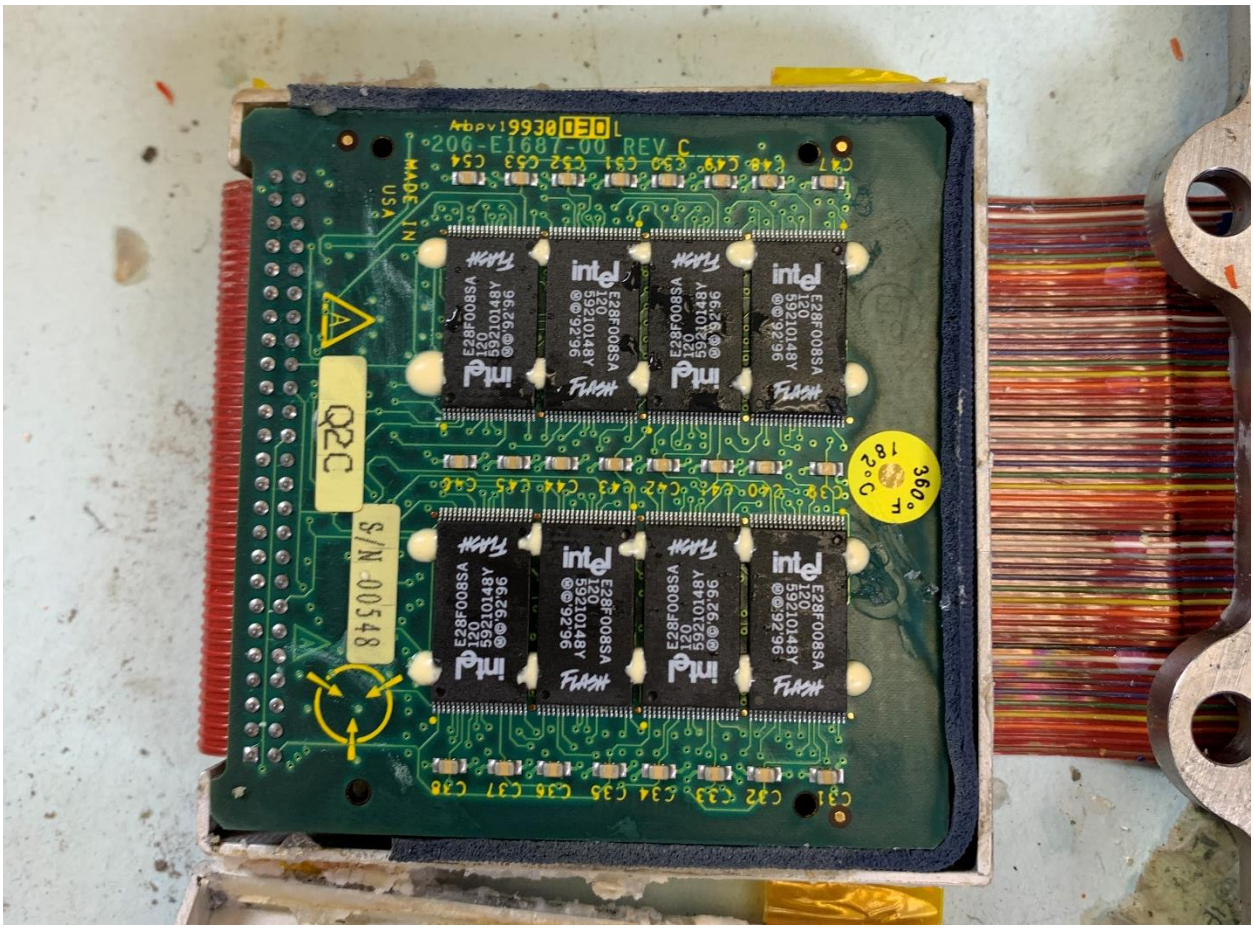

Figure 2. The memory boards of the CVR, before cleaning.

1.2 Audio Recording Description

Each channel's audio quality is indicated in Table 1.[1]

Table 1: Audio Quality

Channel Number	Content/Source	Quality	Duration (mm:ss)
1	Pilot	Fair	30:29
2	Co-Pilot	Good	30:29
3	CAM	Fair	30:29
4	Observer	Fair	30:29

1.3 Timing and Correlation

Timing on the transcript was established by correlating the air traffic control recording transmission time to the corresponding CVR event. Specifically, the CVR time of the radio transmissions around taxi and takeoff from N13GZ was linked to the

[1] Appendix A comprises the CVR Quality Rating Scale.

corresponding ATC local time, and all CVR events were offset to reflect the local Hawaii standard time (HST) 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. The first approximately 10 minutes of the recording are of the previous flight's approach and landing, which transpired uneventfully.

Table 2: CVR Observations.

Time HST (hh:mm:ss.s)	Observation
20:46:32.8	The CVR power was switched on for the accident flight.
20:46:47.5	The pilot and crew engaged in non-pertinent conversation.
20:47:25.0	The engines were started.
20:48:54.7	The pilot listened to ATIS information India at 0554 UTC, however the only information heard was skies clear, temperature 22 degrees Celsius, dewpoint 17 degrees Celsius, altimeter setting of 29.89 inHg.
20:49:55.9	The pilot called for and received his flight clearance.
20:52:01.9	The pilot called for taxi and was instructed to taxi to runway 2.
20:52:55.8	The flight was cleared for takeoff on runway 2 at taxiway Echo.
20:53:17.6	Sounds consistent with an engine run up were noted.
20:53:55.3	The takeoff roll began.
20:54:40.4	The flight was handed to departure.
20:54:56.1	A high pitch electromechanical whining sound similar to the flaps retracting, was noted.
20:55:08.7	The pilot checked in with departure.
20:55:19.1	The pilot engaged in an unintelligible conversation with another person onboard.
20:55:58.9	Unintelligible muttering was noted.
21:02:17.4	The flight was handed to center.
21:02:30.3	An altitude alert was noted.
21:02:55.8	The pilot checked into center leveling at 11,000 feet (ft).

Time HST (hh:mm:ss.s)	Observation
21:03:31.1	The pilot confirmed that he had the latest weather and NOTAMs for their destination airport. The pilot requested the RNAV runway 4 and was told to expect that.
21:03:49.2	The pilot was asked to climb to 13,000 ft, which the pilot confirmed.
21:05:06.1	An altitude alert was noted.
21:06:40.3	An autopilot disconnect alert was noted.
21:07:21.4	An altitude alert was noted.
21:08:22.9	ATC instructed the pilot to fly heading 180, and shortly thereafter corrected the instruction to 200.
21:08:50.3	A female voice in the background was noted, potentially asking if the autopilot was “out,” to which the pilot responded "yep."
21:09:12.4	The flight was instructed to descend at pilot’s discretion to 12,000 ft.
21:09:18.4	A brief altitude alert was noted.
21:09:23.7	A brief unidentified mechanical actuation noise was noted.
21:09:42.4	An altitude alert was noted.
21:09:57.8	The flight was instructed to descend and maintain 8,000 ft.
21:11:05.7	The flight was advised of nearby traffic. The pilot confirmed that he will be looking.
21:12:03.1	The flight was instructed to fly heading 180.
21:12:18.3	The flight was instructed to fly direct to the TAMMI waypoint.
21:13:04.4	ATC asked the pilot to verify they were flying direct to the waypoint.
21:13:08.5	The pilot responded that they’re “off navigation” and “we're gonna give it a try.”
21:13:16.5	ATC instructed the flight to continue their turn, fly heading 170, continue right turn, maintain 8,000 ft.
21:13:19.6	An altitude alert was noted.
21:13:21.5	Continually increasing ambient air/wind noise was noted from this point throughout the remainder of the recording.
21:13:24.8	An altitude alert was noted.
21:13:26.3	The pilot was noted saying “hang on.”

Time HST (hh:mm:ss.s)	Observation
21:13:33.6	Crackling and thumping noises were noted, and the recording ended shortly thereafter.

Submitted by:

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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.