

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



DCA24LA034

COCKPIT VOICE RECORDER

Specialist's Factual Report

July 24, 2024

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 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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A. INCIDENT

Location: Kahului, Hawaii
Date: November 30, 2023
Time: 0614 Hawaii Standard Time (HST)
1614 Coordinated Universal Time (UTC)
Airplane: Boeing 717-200, HAL105, N494HA

B. COCKPIT VOICE RECORDER SPECIALIST

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C. FEDERAL CARRIAGE REQUIREMENTS

Per federal regulation, turbine engine powered aircraft operating under Title 14 *Code of Federal Regulations* (CFR) Part 121 must be equipped with a cockpit voice recorder (CVR) that records a minimum of the last 2 hours of aircraft operation; this is accomplished by recording over the oldest audio data. The incident aircraft was manufactured in 2004. When the CVR is deactivated or removed from the airplane, it retains only the most recent 2 hours of CVR operation.

D. DETAILS OF THE INVESTIGATION

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

Recorder Manufacturer/Model: Honeywell 6022
Part Number: 980-6022-001
Recorder Serial Number: 3369

1.0 Recorder Description

This model CVR, the Honeywell 6022, 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.

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 one 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	Unused	N/A	00:30:17
2	Captain	Excellent	00:30:17
3	First Officer	Excellent	00:30:17
4	CAM	Fair	02:01:13
5	Combined Channels 1, 2, 3	Good	02:05:28

1.3 Timing and Correlation

Timing on the transcript was established by correlating the start time on the recorder's electrically erasable programmable read-only memory (EEPROM) to the start time of the recording. The CVR events were offset to reflect the local Hawaii 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.

The recording began at 06:22:48 after the collision had occurred and captured flight crew discussing the event and contacting their union and a lawyer.

Throughout the recording the crew engaged in multiple conversations discussing the event and expressing uncertainty about whether or not they waved off the tractor driver. Some conversation was inaudible due to radio transmissions. Some of the captain's comments between 06:24:00 and 06:31:25 are paraphrased as follows:

- I don't think that the tractor got the salute.
- I thought I gave the tractor the salute but I can't remember.
- I saw the tractor but didn't give him the wave-off.

¹ Appendix A comprises the CVR Quality Rating Scale.

At 06:49:49, the first officer called a union representative. During the call, the first officer described the event, including that the crew had just finished running the checklist and were taxiing, and there was a tug under the aircraft. They felt some bumps and stopped. The first officer also indicated that the fire department was able to get the person out of the tug. The first officer also indicated the left main gear was affected and this happened when they were on a ramp.

At 07:09:32, a lawyer called the first officer. They had a conversation on speaker phone. The first officer indicated that he and the captain were still in the flight deck and had not left the aircraft yet. The first officer proceeded to describe the event. Paraphrasing of the description follows:

The crew pushed back, started both engines, and ran a checklist. As the crew began taxiing there was a thump. They continued taxiing briefly but stopped immediately after hearing the thump again and shut the engines down. The first officer speculated that the tug was still by the plane after removing the tow bar and that's what they hit. The first officer said that there was no indication of anything out of the ordinary except the sound.

Sounds consistent with the crew departing the aircraft were noted at 07:35:30.

For the remainder of the recording non-pertinent audio was recorded including:

- Audio consistent with the airplane being stationary on the ground with electrical power on.
- Conversations or other audio consistent with maintenance personnel working in or near the cockpit.
- Background sounds in an unoccupied cockpit such as:
 - Radio transmission from other aircraft or ground facilities.
 - Unintelligible or difficult to discern conversation or other sounds likely emanating from the cabin or outside the airplane.

The recording ended at 08:28:16.

Submitted by:

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Mechanical 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.