

National Transportation Safety Board

Office of Research and Engineering

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COCKPIT VOICE RECORDER

Specialist's Factual Report

February 20, 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.

A. ACCIDENT

Location: Santa Ana, California
Date: August 20, 2023
Time: 2315 pacific daylight time (PDT)
Airplane: Boeing 737-800, ASA1288, N516AS

B. COCKPIT VOICE RECORDER SPECIALIST

Specialist: Steven Smith
Mechanical Engineer (Recorder Specialist)
National Transportation Safety Board (NTSB)

C. FEDERAL CARRIAGE REQUIREMENTS

The event aircraft, N516AS, was operating as Title 14 *Code of Federal Regulations* (CFR) Part 121. The event aircraft was manufactured in 2008 and was operating such that it was required to be equipped with a cockpit voice recorder (CVR) that records a minimum of the last 2 hours of aircraft operation.

D. DETAILS OF THE INVESTIGATION

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

Recorder Manufacturer/Model: L3/Fairchild FA2100-1025
Part Number: 2100-1025-22
Recorder Serial Number: 000715735

1.0 Recorder Description

This model CVR, the L3/Fairchild FA2100-1025, 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

Table 1. Audio Quality.

Channel Number	Content/Source	Quality	Duration
1	Extra/Not Used	Not Applicable	2:04:00
2	Captain	Excellent	2:04:00
3	First Officer	Excellent	2:04:00
4	CAM	Good	2:04:00

1.3 Timing and Correlation

Timing on the summary was established by correlating CVR events to common events on the Flight Data Recorder (FDR). Specifically, radio transmissions that the airplane made were correlated to the radio transmit microphone key parameter from the FDR. Next, an offset of the CVR to local time could be determined using the recorded coordinated universal time (UTC) parameter on the FDR. The relationship between CVR elapsed time and local time, PDT, is given by the following expression:

$$\text{CVR Local time (PDT)} = \text{CVR elapsed time} + 22:31:45 \text{ (hh:mm:ss)}$$

Timing in the CVR summary is expressed in local time, PDT, unless otherwise noted.

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 is provided in Appendix B, table 2.

Submitted by:

Steven Smith
Mechanical Engineer (Recorder Specialist)

¹ Appendix A comprises the CVR Quality Rating Scale.

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.

APPENDIX B. CVR SUMMARY

The summary begins at 22:32:00 PDT with a flight attendant having a conversation with the captain regarding all the different airports in the Los Angeles, California area. The first officer is not present in the cockpit during this time. Shortly after this conversation, the flight attendant exited the cockpit and the first officer returned. The first 43 minutes of the recording captured the aircraft descent, approach, and landing, up to the time the aircraft exited the runway for taxiway echo.

Table 2. CVR Summary.

Time PDT (HH:MM:SS)	Observation
22:32:00	The captain and the flight attendant were discussing different airports in the Los Angeles, California area.
22:32:58	The captain checked in with air traffic control (ATC) at flight level (FL) 390.
22:34:23	A flight weather advisory to all aircraft was issued detailing embedded thunderstorms moving from one six zero two five tops FL390.
22:34:33	The CAM picked up sounds consistent with the cabin door being shut.
22:35:05	The first officer said, "I'm back."
22:35:31	The captain told the first officer that they advised the flight attendants on the weather and to start cleaning up.
22:36:03	The crew conducted a landing briefing. Noted was Vref (reference landing speed) of 144 knots, minimums of 255 feet, 2400 RVR (runway visual range), half mile, ILS (instrument landing system) 20 right.
22:40:09	Center controller cleared Alaska 1288 to descend via the OHSEA TWO for arrival. The first officer repeated the clearance back to center.
22:40:35	The crew conducted the descent checklist. The first officer stated, "recall is checked. FMC route verify right. landing data, Vref 40. minimums are 0255. RNP values NA. pressurization is still set for John Wayne. start switches are on. descent checklist complete."
22:41:10	The first officer commented to the captain, "band of weather here, then just spotty."
22:50:26	The crew were instructed to contact Oakland Air Route Traffic Control Center (ZOA) at 124.3.
22:50:39	The first officer contacted ZOA. The first officer stated they were at FL 236 and were descending for the OHSEA TWO. ZOA responded, "Alaska 1288 SoCal roger. information bravo." The first officer responded to center that they would get the updated weather report bravo.

Time PDT (HH:MM:SS)	Observation
22:51:19	The crew reviewed the weather report and were discussing the winds at landing. The first officer was heard saying, "12 gusting at 23."
22:53:52	The crew conducted the approach checklist. The altimeter setting was 29.73 inches of Mercury, the seat belt sign was on, and PA was completed.
22:54:14	The crew discussed the weather. The captain stated, "the tops aren't as high, and no convective activity."
22:56:09	The crew discussed flap usage.
22:56:25	ATC cleared the crew direct to KAYNN. The first officer repeated the command back.
23:00:00	The crew were instructed to contact SoCal approach 128.1. The first officer repeated the command back.
23:00:14	The first officer contacted SoCal approach and reported, "6500 descending via the OHSEA TWO direct KAYNN."
23:00:25	SoCal approach reported altimeter setting of 29.80 inches of Mercury. ATC then said, "advise when you have delta." The first officer responded that they would pick up weather information delta.
23:00:44	The first officer stated, "maybe it will take out the winds."
23:00:55	The captain said, "it's raining now." The first officer replied, "well it's just heavy rain."
23:01:04	The captain asked, "can we land in heavy rain? I don't know. I don't think so. less than seven thousand. can you land in heavy rain? less than good for braking action is a no go."
23:01:24	The captain said, "yeah we can."
23:01:26	The first officer responded back, "five-five-five." ²
23:01:30	The first officer said, "okay I'm going to take off the...", when the captain commented, "take off the winds, yeah. put in five, yeah."
23:01:44	The captain asked, "if it's moderate, moderate rain, how's that?" The first officer replied, "yeah."
23:01:58	The captain said, "hopefully it just blows through so... might be gone by the time we get there." The first officer replied, "yeah."
23:02:04	The first officer said, "these things go-go...go by quick." The captain responded, "yeah they do."

² five-five-five is from the runway condition report, which is sent to pilots to inform them of the conditions of the runway. Each number indicates a location on the runway: touchdown, midpoint, and rollout. The rating scale is from 0 to 6, with value of 0 being less than poor and value of 6 being dry. A value of 5 is considered "good" for braking action.

Time PDT (HH:MM:SS)	Observation
23:02:08	The first officer said, "especially with the winds like that." The captain replied, "well it's variable now, three (something/seven)" [mumbled].
23:02:13	ATC instructed Alaska 1288 to descend to 3000. The crew was also notified that the tower was closed, and they would need to call a separate phone number to cancel their flight plan once on the ground. The first officer repeated the clearance back and advised that they had weather information delta.
23:02:37	The crew received the phone number to cancel the flight plan once on the ground.
23:07:05	The captain stated, "winds aren't too strong up here either, only 15." The first officer responded, "yeah, it's just, just squirrely."
23:08:39	The captain requested flaps 1.
23:08:45	The captain requested flaps 5.
23:09:13	ATC cleared Alaska 1288 for ILS approach. The first officer repeated the clearance back stating, "one uh seven zero, three thousand until we establish, cleared for ILS two zero right approach, Alaska 1288."
23:09:34	The first officer called out, "glideslope is alive."
23:09:58	The captain stated, "winds are hollowing here at 33... 37."
23:10:16	The first officer called out, "localizer is alive."
23:10:35	The localizer and glideslope were captured.
23:10:42	The captain requested the gear down.
23:10:58	The captain requested flaps 15.
23:11:06	The captain requested flaps 25.
23:11:16	The captain requested flaps 30.
23:11:19	The captain requested flaps 40.
23:11:24	The crew began the landing checklist. The first officer said, "speedbrake", at which the captain replied, "is armed green light."
23:11:27	The first officer said, "and gear", at which the captain replied, "down three green."
23:11:28	The first officer said, "and flaps", at which the captain replied, "40...40 green light."
23:11:31	The first officer then said "landing checklist complete."
23:11:40	The first officer stated, "winds are howling from the left." The captain responded back, "yeah they are right now, 42 knots."

Time PDT (HH:MM:SS)	Observation
23:11:55	The first officer made a position report of 6 mile final to runway 20 right over the common traffic advisory frequency (CTAF).
23:12:47	The CAM picked up sounds from the windshield wipers.
23:13:00	The first officer made a position report of 4 mile final to runway 20 right over CTAF.
23:13:28	The first officer stated that they could see the ground.
23:13:42	The captain disengaged the autopilot and the CAM picked up the autopilot disengage horn.
23:13:58	The first officer made a position report of 2 mile final to runway 20 right over CTAF.
23:14:11	The captain said, "the winds are 30 knots."
23:14:14	The first officer stated, "runway is in sight, just at one o'clock."
23:14:27	The first officer made a position report of short final to runway 20 right over CTAF.
23:14:34	The minimums callout from the enhanced ground warning proximity system (EGWPS) was observed on the CAM.
23:14:43	The first officer said, "looking good." The captain replied, "yup." The first officer said, "here we go, alright. we've got a tailwind now." The captain responded back, "yup."
23:14:56	Sounds consistent with touchdown were observed with a second loud thump heard on the CAM.
23:14:57	The first officer called out, "speedbrake."
23:15:00	The captain said, "what the heck. uh, oh, we have a flat tire or something."
23:15:10	The first officer said, "autobrakes disarmed."
23:15:12	The first officer called out 60 knots.
23:15:15	The first officer called out 40 knots.
23:15:18	The captain said, "that felt weird. I think I can get off the runway though."
23:15:25	The first officer radioed that they were getting off the runway at taxiway echo.
23:15:34	The captain said, "it feels like a flat tire, doesn't it."
23:15:36	The first officer said, "yeah, that was a flat tire."
23:15:37	The captain said, "yeah, right when we touched. I don't know if I hit hard."
23:15:40	The first officer responded back, "no, you didn't hit that hard. I don't know what happened."
23:15:43	The first officer started the auxiliary power unit (APU).

Time PDT (HH:MM:SS)	Observation
23:15:51	The first officer radioed operations to get a tow truck. The captain thought they could make it to the gate, when the first officer said, "look how low that cowl is. get off the runway first."
23:16:39	The first officer was in radio communication with the Alaska Airlines ground operations in Santa Ana. Sounds consistent with the cockpit window opening and outside ambient noise from the airport and the aircraft were observed. While the first officer was communicating with operations, the captain stated they collapsed the landing gear. The first officer requested operations to send out maintenance to meet the aircraft at taxiway echo off runway 20 right.
23:17:47	The number 1 engine was shutdown.
23:18:42	The crew discussed the landing. The captain said, "it was firm, but it wasn't that hard. not enough to collapse the gear." The first officer responded, "yeah, it was firm, but not that hard." The captain replied, "we had three greens."
23:22:05	The number 2 engine was shutdown.
00:21:12	The crew conducted the shutdown checklist.
00:23:36	Sounds consistent with the crew leaving the cockpit.
00:36:00	The recording ended.