

# National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



DCA23FA339

## COCKPIT VOICE RECORDER

Specialist's Factual Report

June 28, 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 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: Charlotte, North Carolina  
Date: June 28, 2023  
Time: 0858 eastern daylight time (EDT)  
1258 coordinated universal time (UTC)  
Airplane: Boeing 717-200, Delta Air Lines, N955AT

## **B. COCKPIT VOICE RECORDER SPECIALIST**

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

## **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. 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 SSCVR 6022  
Part Number: 980-6022-001  
Recorder Serial Number: 3575

### **1.0 Recorder Description**

This model CVR, the Honeywell SSCVR 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 a 3-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 3 channels of audio information: one channel for each flight crew, and one channel for a cockpit observer.

## 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.<sup>1</sup> Channel number three 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    | 00:30:31            |
| 2              | First Officer           | Good    | 00:30:31            |
| 3              | Observer/Unused         | N/A     | 00:30:31            |
| 4              | CAM                     | Good    | 02:01:07            |
| 5              | Combined Channels 1,2,3 | Good    | 02:04:57            |

## 1.3 Timing and Correlation

Timing on the transcript 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 EDT 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.

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<sup>1</sup> Appendix A comprises the CVR Quality Rating Scale.

**Table 2.** Summary of CVR Audio.

| <b>Time EDT<br/>(hh:mm:ss.s)</b> | <b>Observation</b>                                                                                                                                                               |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06:47:30.0                       | The recording began with the airplane on the ground with the pilots conducting preflight checks.                                                                                 |
| 07:39:44.1                       | The aircraft took off normally and no abnormal sounds were noted.                                                                                                                |
| 07:41:58.9                       | The crew performed the after-takeoff checklist.                                                                                                                                  |
| 07:44:10.1                       | The flight was cleared up 14,000 feet (ft).                                                                                                                                      |
| 07:45:08.0                       | The flight was cleared up to Flight Level (FL) 230.                                                                                                                              |
| 07:51:44.0                       | The flight was cleared up to FL 250.                                                                                                                                             |
| 07:56:04.3                       | The crew conducted a standard arrival briefing.                                                                                                                                  |
| 08:00:24.2                       | The flight was cleared to descend via the JONZE arrival.                                                                                                                         |
| 08:06:07.6                       | The crew performed the descent checklist.                                                                                                                                        |
| 08:10:11.9                       | The crew performed the approach checklist.                                                                                                                                       |
| 08:12:24.7                       | The crew confirmed they were at 8,000 ft for 7,000 ft.                                                                                                                           |
| 08:13:06.6                       | The flight was cleared to 5,000 ft.                                                                                                                                              |
| 08:14:19.5                       | The crew confirmed they were at 6,000 ft for 5,000 ft.                                                                                                                           |
| 08:15:49.8                       | The crew were instructed to intercept the runway 36L localizer.                                                                                                                  |
| 08:16:10.8                       | The flight was cleared for the ILS approach to runway 36L.                                                                                                                       |
| 08:18:32.4                       | The flight was handed to Charlotte Tower.                                                                                                                                        |
| 08:20:11.3                       | The crew called gear down and an increase in ambient noise consistent with gear deployment was noted.                                                                            |
| 08:20:15.4                       | The crew checked in with tower and were cleared to land on runway 36L.                                                                                                           |
| 08:20:25.9                       | The crew confirmed that the nose gear was not showing down and locked.                                                                                                           |
| 08:20:37.5                       | The crew decided to go around, and then informed tower of their intentions due to gear unsafe indications. Shortly thereafter an automated autopilot disconnect alert was noted. |
| 08:21:04.4                       | The crew retracted gear and flaps.                                                                                                                                               |
| 08:21:58.8                       | The crew checked in with Charlotte Approach, were given vectors to set up for the approach again and told approach that they would need several minutes to run checklists.       |

| <b>Time EDT<br/>(hh:mm:ss.s)</b> | <b>Observation</b>                                                                                                                                                                                                                                                                |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08:22:46.1                       | The crew confirmed they had 6,100 pounds of fuel.                                                                                                                                                                                                                                 |
| 08:22:48.9                       | The crew ran an abnormal checklist, gear unsafe indications with gear handle down.                                                                                                                                                                                                |
| 08:23:31.1                       | The crew briefed a flight attendant over the intercom.                                                                                                                                                                                                                            |
| 08:23:53.8                       | The crew decided to select flaps 13 and attempted to lower the gear again.                                                                                                                                                                                                        |
| 08:24:02.9                       | The crew confirmed again that the gear was down with a nose wheel unsafe indication. The crew continued with the non-normal checklist.                                                                                                                                            |
| 08:24:33.9                       | As part of the checklist, the crew discussed then executed the manual gear extension procedure.                                                                                                                                                                                   |
| 08:25:05.0                       | The crew declared an emergency with approach and informed them that they would need to stop on runway and would need another two minutes before proceeding inbound.                                                                                                               |
| 08:25:43.1                       | Approach offered the crew a low approach to have the tower look at the gear, which the crew declined.                                                                                                                                                                             |
| 08:27:38.0                       | While talking to a flight attendant, the crew discussed having a code red situation with no plan to evacuate. They would then plan to be towed to gate. The captain then made an announcement to the passengers.                                                                  |
| 08:28:26.8                       | Discussing the non-normal checklist, the crew discussed how to stow the emergency lever. The lever was not initially stowing; however the crew troubleshooted and eventually successfully stowed the lever.                                                                       |
| 08:29:07.8                       | The crew informed approach they were ready to turn back in and received vectors to return.                                                                                                                                                                                        |
| 08:29:17.5                       | The crew read procedure 14.10, landing with abnormal gear configuration, and were instructed to refer to the flight crew training manual (FCTM, 717 8.6 flight crew duties). Including in the discussion was to plan for a flaps 40 landing and to pull the GPWS circuit breaker. |
| 08:29:51.6                       | The crew pulled the circuit breaker for the GPWS.                                                                                                                                                                                                                                 |
| 08:30:17.2                       | The crew shut down the APU for landing.                                                                                                                                                                                                                                           |
| 08:30:40.0                       | The crew confirmed with approach that they have 104 persons on board and 50 minutes of fuel remaining.                                                                                                                                                                            |
| 08:31:13.0                       | The flight was cleared for the ILS approach to runway 36L.                                                                                                                                                                                                                        |
| 08:31:36.1                       | The crew continued reading additional deferred checklist items.                                                                                                                                                                                                                   |

| <b>Time EDT<br/>(hh:mm:ss.s)</b> | <b>Observation</b>                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08:32:03.8                       | Per the checklist, the crew turned the air conditioning packs off and set the cabin pressure to manual.                                                                                                                                                                                                                                                                                                                          |
| 08:32:46.8                       | The crew continued reading the non-normal guidance for landing, including what to expect and a description of the process, including to hold the nose off the ground as long as possible and that idle reverse thrust may be used with caution. The instructions continued with lowering the nose gently, and upon contact, to use maximum braking. After stopping, the guidance was to run the evacuation checklist, if needed. |
| 08:34:14.7                       | The crew confirmed they had completed everything before the landing checklist.                                                                                                                                                                                                                                                                                                                                                   |
| 08:35:38.6                       | The crew discussed that if there was no nose gear, they would plan to shut down and evacuate, if needed.                                                                                                                                                                                                                                                                                                                         |
| 08:36:23.5                       | The crew followed up with the flight attendant over the intercom, planning to stop on the runway with no automatic evacuation.                                                                                                                                                                                                                                                                                                   |
| 08:36:40.2                       | The crew checked in with tower and were cleared to land on runway 36L. The crew informed tower that they would plan to stop on the runway.                                                                                                                                                                                                                                                                                       |
| 08:37:30.6                       | The crew discussed with tower strategies for communicating with emergency vehicles. Tower confirmed that the emergency vehicles were on the tower frequency.                                                                                                                                                                                                                                                                     |
| 08:37:59.5                       | The crew selected flaps 18.                                                                                                                                                                                                                                                                                                                                                                                                      |
| 08:38:16.0                       | The crew continued the landing checklist, including selecting flaps 40, and confirming gear down with two green, and speedbrakes armed.                                                                                                                                                                                                                                                                                          |
| 08:38:26.2                       | An automated GPWS landing gear alert began sounding repeatedly. The crew discussed that the warning should cut off at 100 ft.                                                                                                                                                                                                                                                                                                    |
| 08:38:43.1                       | The crew disengaged the autopilot.                                                                                                                                                                                                                                                                                                                                                                                               |
| 08:40:08.2                       | Tower called the flight to inform the crew that they could not see the nose gear but could see the mains.                                                                                                                                                                                                                                                                                                                        |
| 08:40:34.5                       | An automated GPWS minimums callout was noted.                                                                                                                                                                                                                                                                                                                                                                                    |
| 08:40:46.4                       | The crew decided to go around.                                                                                                                                                                                                                                                                                                                                                                                                   |
| 08:40:48.7                       | An automated GPWS 50-foot callout was noted.                                                                                                                                                                                                                                                                                                                                                                                     |
| 08:40:52.8                       | The crew selected flaps 18.                                                                                                                                                                                                                                                                                                                                                                                                      |
| 08:40:56.6                       | The crew retracted the landing gear.                                                                                                                                                                                                                                                                                                                                                                                             |
| 08:41:03.6                       | The GPWS landing gear alerts ceased.                                                                                                                                                                                                                                                                                                                                                                                             |

| <b>Time EDT<br/>(hh:mm:ss.s)</b> | <b>Observation</b>                                                                                                                                                            |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08:41:07.3                       | The crew selected flaps 13.                                                                                                                                                   |
| 08:41:12.7                       | The flight was instructed to turn left to 270 and climb to 4,000 ft.                                                                                                          |
| 08:41:22.7                       | The crew engaged the autopilot.                                                                                                                                               |
| 08:41:49.5                       | The flight was handed to approach.                                                                                                                                            |
| 08:42:19.2                       | One of the crew checked in with approach and planned to come back around for a 10-mile final as the other crew tried to contact Atlanta Radio, a company maintenance channel. |
| 08:44:11.6                       | Approach offered runway 36C and the crew declined.                                                                                                                            |
| 08:44:20.5                       | The crew gave up trying to contact Atlanta Radio.                                                                                                                             |
| 08:44:26.8                       | The crew discussed manipulating the controls to "put some g's on it" to unlock the gear, both lateral and vertical.                                                           |
| 08:44:50.7                       | While talking to a flight attendant over the intercom, the crew discussed a plan to evacuate on the runway through the forward doors.                                         |
| 08:45:07.5                       | The crew reran the descent and approach checklists.                                                                                                                           |
| 08:45:21.2                       | The crew contacted approach, informed them that they were ready to come in and planned to stop on the runway. The flight was cleared down to 3,000 ft.                        |
| 08:45:41.3                       | The crew made an announcement to the passengers.                                                                                                                              |
| 08:45:55.1                       | The flight was instructed to turn left to 090.                                                                                                                                |
| 08:46:01.4                       | The crew completed the approach checklist.                                                                                                                                    |
| 08:46:22.9                       | The flight was cleared down to 2,500 ft.                                                                                                                                      |
| 08:47:02.2                       | The flight was cleared for the visual approach to runway 36L.                                                                                                                 |
| 08:47:25.4                       | The crew selected flaps 18.                                                                                                                                                   |
| 08:47:28.6                       | The crew selected gear down and were handed over to tower.                                                                                                                    |
| 08:47:42.1                       | The crew checked in with tower on the visual approach.                                                                                                                        |
| 08:47:44.9                       | The crew selected flaps 40.                                                                                                                                                   |
| 08:47:45.7                       | Tower cleared the flight to land on runway 36L reporting winds from 040 at 5 knots.                                                                                           |
| 08:47:50.2                       | An automated GPWS landing gear alert began sounding repeatedly.                                                                                                               |
| 08:47:55.9                       | The crew confirmed with tower that the gear was not coming down.                                                                                                              |

| <b>Time EDT<br/>(hh:mm:ss.s)</b> | <b>Observation</b>                                                                                                       |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| 08:48:20.3                       | The crew completed the final deferred items on landing checklist.                                                        |
| 08:48:50.1                       | The crew tried the manual gear extension one more time, with no effect. The crew then stowed the manual extension lever. |
| 08:49:40.3                       | The crew disconnected the autopilot.                                                                                     |
| 08:49:41.1                       | The crew confirmed flaps 40 and spoilers armed.                                                                          |
| 08:49:49.2                       | The crew confirmed landing checklist complete.                                                                           |
| 08:50:07.5                       | An automated GPWS 1,000-foot callout was noted.                                                                          |
| 08:50:14.9                       | Tower confirmed the nose gear was not down.                                                                              |
| 08:50:19.4                       | The crew preemptively pulled out the evacuation checklist.                                                               |
| 08:50:44.8                       | An automated GPWS 500-foot callout was noted.                                                                            |
| 08:50:51.8                       | Tower updated winds to 020 at 6 knots.                                                                                   |
| 08:50:55.9                       | An automated GPWS approaching minimums callout was noted.                                                                |
| 08:51:03.5                       | An automated GPWS minimums callout was noted.                                                                            |
| 08:51:12.1                       | The GPWS landing gear alerts ceased.                                                                                     |
| 08:51:14.3                       | The crew confirmed autothrottles were off.                                                                               |
| 08:51:15.1                       | An automated GPWS 50-foot callout was noted.                                                                             |
| 08:51:16.1                       | An automated GPWS 40-foot callout was noted.                                                                             |
| 08:51:16.9                       | An automated GPWS 30-foot callout was noted.                                                                             |
| 08:51:17.7                       | An automated GPWS 20-foot callout was noted.                                                                             |
| 08:51:19.1                       | An automated GPWS 10-foot callout was noted.                                                                             |
| 08:51:20.3                       | An automated GPWS 5-foot callout was noted.                                                                              |
| 08:51:22.7                       | The first officer made a comment to "hold it up."                                                                        |
| 08:51:24.0                       | Sounds consistent with main gear touchdown were noted.                                                                   |
| 08:51:25.5                       | The crew confirmed spoilers were up.                                                                                     |
| 08:51:35.6                       | A significant increase in ambient noise was noted, consistent with the nose contacting the runway.                       |

| <b>Time EDT<br/>(hh:mm:ss.s)</b> | <b>Observation</b>                               |
|----------------------------------|--------------------------------------------------|
| 08:51:43.8                       | The first officer made an 80-knot callout.       |
| 08:51:56.4                       | Ambient noises ceased.                           |
| 08:51:56.5                       | The crew began running the evacuation checklist. |
| 08:52:11.2                       | The crew made the easy victor announcement.      |
| 08:52:27.2                       | The recording ended.                             |

Submitted by:

Michael Portman  
Senior 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.