

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, D.C.



SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

ERA21LA208

By
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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 an NTSB 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.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

June 22, 2023

Cockpit Voice Recorder

Specialist's Factual Report **By Kyle Garner**

1. EVENT

Location: Ridgeland, South Carolina
Date: May 05, 2021
Aircraft: Gulfstream G150
Registration: N22ST
Operator: Snider Fleet Solutions
NTSB Number: ERA21LA208

A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for evaluation.

2. GROUP

A CVR group was not convened.

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model:	Universal CVR-120
Recorder Serial Number:	2033

3.1 CVR Carriage Requirements

Per federal regulation, multiengine turbine-powered aircraft with more than six passenger seats and requiring two pilots manufactured before April 7, 2010 and operated under 14 *Code of Federal Regulations* Part 91, must be equipped with a CVR that records a minimum of the last 30 minutes of aircraft operation.

3.2 Recorder Description

This model CVR, the Universal CVR-120, records a minimum of 120 minutes of digital audio stored on solid-state memory modules. There are four sources of audio input: one channel for each flight crew, one spare channel (i.e. for an observer), and one channel for the cockpit area microphone (CAM). The pilot, co-pilot, and spare channels are recorded independently for a minimum of 30 minutes. In addition, a mix of the pilot, co-pilot, and spare channels is recorded for a minimum of 120 minutes. The CAM is recorded on two channels: high-quality audio for a minimum of 30 minutes and lower-quality audio for a minimum of 120 minutes.

3.3 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. The CVR, as received, is shown in Figure 1.



Figure 1. Universal CVR-120, as received.

3.4 Audio Recording Description

Each channel's content, recording quality, and duration are indicated in Table 1.

Table 1. Audio Content, duration, and quality.¹

	Channel	Content/Source	Designed Duration	Actual Duration (hh:mm:ss)	Recording Quality
Cockpit Audio Input Channels	1	Spare/Observer	30 minutes	00:36:14	Good
	2	Co-Pilot			Good
	3	Pilot			Good
	4	CAM HQ			Good
Combined Channels	5	Mix 1/2/3	120 minutes	02:06:37	Fair
	6	CAM LQ			Fair

¹ See attached CVR Quality Rating Scale.

3.5 Timing and Correlation

Timing on the transcript was established by correlating the CVR audio from the takeoff from New Smyrna Beach Municipal Airport (EVB) and the landing at Ridgeland-Claude Dean Airport (3J1) to common events in Automatic Dependent Surveillance-Broadcast (ADS-B) data. Once a correlation between the CVR audio data and the ADS-B data was established, a reference to Coordinated Universal Time (UTC) time was determined using the UTC timestamp on the ADS-B data. UTC was then converted to local time, eastern daylight time (EDT), by subtracting four hours. For the remainder of this report, all times are referenced as EDT.

3.6 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.

Table 2 provides a list of observations from the 30-minute cockpit audio input channels relevant to the investigation. The 120-minute combined channels were reviewed and did not have any additional information relevant to the investigation not contained in the 30-minute channels.

Table 2. Summary of CVR events².

EDT of observation, hh:mm:ss	Detail of observation
09:57:20	<i>[30-minute channels started recording. The aircraft was on the ground at EVB, preparing for takeoff from runway 25.]</i>
09:57:42	Sounds consistent with increasing engine thrust were noted.
09:58:02	The crew called V _r [rotation speed] and rotate.
09:58:07	The crew indicated the aircraft was climbing at a positive rate and retracted the landing gear and flaps.
09:58:53	The crew checked in with the first Daytona departure controller. The controller cleared the aircraft to climb to 3,000 feet.
10:00:16	The controller cleared the aircraft to climb to 11,000 feet.
10:00:41	The controller apologized and asked the crew to maintain 4,000 feet. The controller then cleared the aircraft direct to ROYES.
10:01:44	The crew checked in with the second Daytona departure controller and reported they were level at 4,000 feet.
10:02:27	The controller cleared the aircraft to climb to 11,000 feet.
10:03:22	The crew discussed reported winds at airports near 3J1 ³ . The pilot in command (PIC) noted that the wind direction ⁴ at nearby airports was reported as 240 to 250 degrees and the winds favored landing on runway 36.
10:04:07	A passenger asked the crew when they would be arriving at 3J1. After telling the passenger the estimated arrival time, which was inaudible on the recording, the PIC stated to the passenger, "i'll speed up. i'll go real fast here."
10:04:58	The PIC stated to the second in command (SIC), "i'm already lettin' it roll." The SIC replied, "yeah we're doing 300 [knots] at 9,000 [feet]."

² In the table, [] indicates an editorial insertion, @ precedes a non-pertinent word, and # precedes an expletive.

³ 3J1 does not have an automated weather observing system (AWOS).

⁴ Wind direction at AWOS is reported as the direction from which the wind is blowing.

EDT of observation, hh:mm:ss	Detail of observation
10:05:28	The crew noted that they and another aircraft (hereafter referred to as 'aircraft 2') would be arriving at 3J1 one after the other.
10:06:26	The crew checked in with the first Jacksonville center controller and reported they were level at 11,000 feet. The controller cleared the aircraft to climb to flight level (FL) 230.
10:06:56	The PIC noted to the SIC that because the passengers had arrived at the aircraft later than expected at EVB, it wasn't their fault that aircraft 2 was going to arrive at 3J1 first. The PIC then stated, "i can only go as fast as I can go now. i mean we've already cut it down to 1435 [1035 EDT] so..."
10:08:07	The crew discussed asking the controller for clearance direct to the destination. The PIC stated, "Anything's going to help at this point."
10:08:18	The crew asked the controller for clearance direct to the destination. The controller cleared the aircraft direct to the destination.
10:09:03	The SIC stated, "that's all we can do here we're going 330 [knots] and direct to the destination so..."
10:09:52	The PIC noted that their estimated arrival time was still 1435 [1035 EDT] and aircraft 2's estimated arrival time was 1433 [1033 EDT]. The PIC then stated, "that's what they track their airplane [aircraft 2] at but they'll slow to 250 [knots] below 10 [thousand feet] and we won't. we know what we're doing right now we're trying to win a race." The SIC stated, "that's right." The PIC then replied, "this is NASCAR." There was audible laughter.
10:10:46	The crew discussed how they would arrive at the airport early the next morning to make the aircraft's cabin temperature cooler before departure.
10:13:31	The PIC noted that they had shed a minute from their estimated arrival time, and it was now 1434 [1034 EDT].
10:14:59	The crew checked in with the second Jacksonville center controller and reported they were at 18,200 feet and climbing to FL230.
10:18:07	The crew asked the controller if they could level off at FL210. The controller cleared the aircraft to level off at FL210.
10:18:59	The crew discussed reported winds of 280 degrees at 3 knots at an AWOS in the vicinity of the arrival airport.

EDT of observation, hh:mm:ss	Detail of observation
10:21:32	The PIC stated that the passenger on board, @ [REDACTED], liked to challenge the PIC to see how fast they could reach a destination. The PIC described a previous flight where the PIC told the passenger the flight would be 40 minutes in duration and the passenger challenged him [the PIC] to fly it in 39 minutes instead. The PIC stated, "he [the passenger] always likes to give the challenge. how fast can you go? how fast can you get there? but that's the name of the game. that's the reason you own a jet."
10:22:45	The controller cleared the aircraft to descend to 11,000 feet.
10:24:17	The crew reported that the flight management system was correctly set for arrival and the fuel quantity was balanced.
10:25:30	A 2450Hz tone was noted. Per the aircraft manufacturer, this was the overspeed warning tone. The PIC stated, "goal achieved." The PIC then asked the SIC, "you saw that? it was checkerboard [laughter]. i achieved the goal." The SIC stated, "final lap." The overspeed warning tone ceased about 8 seconds later.
10:27:47	The crew checked in with the Atlanta approach controller and reported they were level at 11,000 feet.
10:28:27	The PIC stated that he had the arrival airport in sight.
10:28:31	The controller cleared the aircraft to descend to 2,000 feet and inquired which runway they would like to land on. The crew asked the controller for a straight-in approach to runway 36 at 3J1.
10:29:02	A 2450Hz overspeed warning tone was noted. The overspeed warning tone ceased about 11 seconds later.
10:29:21	The crew made a call on 3J1's UNICOM frequency and stated they were approximately 10 miles to the south with intentions to land straight in on runway 36.
10:29:30	A 2450Hz overspeed warning tone was noted. The overspeed warning tone ceased about 15 seconds later.

EDT of observation, hh:mm:ss	Detail of observation
10:30:00	Aircraft 2 was heard checking in with the same Atlanta approach controller. The controller told aircraft 2 that they were second in line for a landing at 3J1. The PIC expressed excitement upon hearing the controller tell aircraft 2 that they were second in line. The PIC then told the passenger that they would be arriving before aircraft 2. There was audible laughter.
10:31:06	The crew requested to cancel their instrument flight rules (IFR) flight plan with the controller. The controller acknowledged that their IFR flight plan had been canceled.
10:31:30	The crew called 3J1's UNICOM frequency and reported they were about 5 miles out with intentions to land straight in on runway 36.
10:31:35	A double chirp tone was noted. Per the aircraft manufacturer, this tone was the autopilot disconnect tone.
10:31:46	The PIC called for flaps 12.
10:32:04	The PIC called for flaps 20.
10:32:08	The SIC asked, "should we s-turn this thing?" The PIC replied, "nah we got it."
10:32:20	The PIC asked the SIC to lower the landing gear.
10:32:28	The PIC inquired, "what's my speeds?" The SIC replied, "170 [knots]."
10:32:30	The PIC called for flaps full.
10:32:35	An electronic voice stated, "one thousand."
10:32:41	An electronic voice stated, "sink rate." The SIC stated, "we know it." The PIC asked if the flaps were fully deployed. The SIC replied that they were fully deployed.
10:32:46	The SIC called out, "150 [knots]."
10:32:47	An electronic voice stated, "sink rate. sink rate. sink rate. pull up."

EDT of observation, hh:mm:ss	Detail of observation
10:32:58	An electronic voice stated, "two hundred."
10:32:59	An electronic voice stated, "sink rate." The SIC called out, "130 [knots]." The PIC replied, "yup, slowing."
10:33:04	An electronic voice stated, "fifty, thirty, twenty, ten." Sounds similar to the aircraft touching down on the runway were noted thereafter.
10:33:12	The PIC stated, "come on T-Rs [thrust reversers]."
10:33:19	The PIC exclaimed, "# [REDACTED]!"
10:33:20	The SIC asked the PIC if he was on the brakes. The PIC replied that he was. The SIC asked the PIC if he wanted him to be on the brakes as well. The PIC replied yes.
10:33:25	The PIC stated, "we are not stoppin'." The SIC replied, "no we're not."
10:33:26	There was an increase in ambient noise on the CAM channel.
10:33:29	The PIC exclaimed, "damn!"
10:33:33	<i>[30-minute channels stopped recording.]</i>

Attachment I

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.