NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, D.C. 20594

GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

DCA20LA013

By
Nick Swann

WARNING

The reader of this report is cautioned that the transcript of a cockpit voice recorder audio recording is not a precise science but is the best product possible from a Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript 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 transcript as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

December 15, 2022

Cockpit Voice Recorder

Group Chairman's Factual Report
By Nick Swann

1. SUMMARY

Location:	Chicago, IL
Date:	November 11, 2019
Aircraft:	Embraer EMB-145, Registration N619AE
Operator:	American Eagle (Envoy), Flight 4125
NTSB Number:	DCA20LA013

A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for evaluation. The CVR group meeting convened on November 20, 2019 and a partial transcript was prepared for the 2-hour, 5-minute and 15-second digital recording (see attached).

2. GROUP

Chairman:	Nick Swann Recorder Specialist National Transportation Safety Board
Member:	Captain Brandon Currier Captain Air Line Pilots Association
Member:	Captain Leslie Hock Director Flight Ops Tech Envoy Air
Member:	Todd Gentry Accident Investigator Federal Aviation Administration

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model:	**Allied Signal 6022**
Recorder Serial Number:	**1211**

3.1 CVR Carriage Requirements

Per federal regulation, turbine engine powered aircraft operating under 14 CFR Part 121 must be equipped with a 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.

3.2 Recorder Description

This model CVR, the Allied Signal 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.

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.

3.4 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	Unknown	N/A	30 min
2	Audio panel of the First Officer	Excellent	30 min
3	Audio Panel of the Captain	Excellent	30 min
4	Cockpit Area Microphone	Excellent	2 hrs

3.5 Timing and Correlation

Timing on the transcript was established by correlating the CVR events to common events on the flight data recorder (FDR). Specifically, radio transmissions that the aircraft made were correlated to the radio transmit microphone key parameter from the FDR. Each of the 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.

3.6 Description of Audio Events

The recording began at 06:00:35 central standard time.

[1] See attached CVR Quality Rating Scale.

This summary begins with the accident flight nearing the final approach fix. The summary depicts the circumstances and actions of the crew during the first approach of the accident flight.

At 07:17:23 the crew switched the radio to the tower frequency. The tower controller was speaking with American 140. The controller stated that she will “see what other options” she has for the flight and American 140 requested to be informed if they decide to replow the runway. The crew made comments indicating they had heard the request to have the runway replowed. At 07:17:35, Skywest 3208 was heard initiating a go-around. At 07:17:49, the crew informed the tower that they are at the BUGSY final approach fix. Just after, the tower controller cleared Envoy 4125 to land on runway 10L. She informed them that the RVR is 5500 and the RCC is 555. She adds that the “braking is medium to [taxiway] november 3, poor past.” The crew acknowledged the landing clearance.

At 07:18:06 the tower controller was heard asking Skywest 3208 why they had initiated a go-around. At the same time, the first officer was heard asking the captain why the Skywest flight executed a go-around. The captain questioned where in the sequence the Skywest flight was in relation to them. The crew appeared to have missed the response from the Skywest pilot to the tower controller indicating that the go-around was executed due to “braking action.”

At 07:18:27 the crew performed the before landing checklist. At 07:18:58 the tower controller asked United 203 if they would “agree that the braking action is medium up to [taxiway] november 3” and that it “got slick at that point.” United 203 agreed with what the controller stated and added that “it just gets really hard to hold cross – uh – the centerline after that because of the crosswind.” During this conversation between the controller and the United 203 flight crew, the accident aircraft is passed through 500 feet, as indicated by the first officer.

At 07:19:22, the first officer stated “continue.” At 07:19:34 the first officer stated that he had the runway in sight. At 07:19:35, the automated minimums callout was made and the first officer stated again that he had the runway in sight. At 07:19:38, as the captain stated he is landing the tower controller called for a go-around. The crew initiated a go-around and at 07:19:44, they were heard acknowledging the command from the tower controller.

During the go-around, the crew completed their required checklists and briefings as they set up for their second approach. The crew comments indicated they were not aware why they were asked to go-around. After they were set up for the second approach, the crew was discussed possible reasons for why they were told to go around. The full transcript begins during the second approach, just before the accident flight reached the final approach fix.

The transcript began at 07:31:30.

As part of the NTSB's accident investigation process, the flight crew was invited to review the CVR transcript and suggest corrections or additions. At the time of the writing of this report, they have not responded to the invitation.

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.

Transcript of an Allied Signal 6022 solid state cockpit voice recorder, serial number 1211, installed on an American Eagle Embraer EMB-145 (N619AE), which departed the paved surface at Chicago O'Hare International Airport (KORD) in Chicago, IL.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
APR	Radio transmission from the Chicago approach controller
TWR	Radio transmission from the Chicago O'Hare airport tower controller
American 466	Radio transmission from the crew of American flight 466
Envoy3551	Radio Transmission from the crew of Envoy flight 3551
-1	Voice identified as the captain
-2	Voice identified as the first officer
*****	Unintelligible word
#	Expletive
( )	Questionable insertion
[ ]	Editorial insertion

Note 1: Times are expressed in central standard time

Note 2: Generally, only radio transmissions to and from the incident aircraft were transcribed.

Note 3: Words shown with excess vowels, letters, or drawn out syllables are a phonetic representation of the words as spoken.

Note 4: A non-pertinent word, where noted, refers to a word not directly related to the operation, control or condition of the aircraft.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
06:00:35.0 **START OF RECORDING**			
07:31:30 **START OF TRANSCRIPT**			
07:31:30.4 **HOT-1**	there we go.		
07:31:30.7 **HOT-2**	just got a three thousand five hundred.		
07:31:43.1 **HOT-1**	alright - well - if we go around this time we're going to Cincy.		
		07:31:46.5 **APR**	Envoy forty one twenty five hundred seventy knots down to BUGSY when you get to BUGSY call the tower on one three two point seven.
		07:31:51.4 **RDO-2**	alright BUGSY - uh - thirty two point seven - and anyone getting in - Envoy forty one twenty five.
		07:31:55.8 **APR**	anyone what?
		07:31:57.7 **RDO-2**	is anyone - uh - landing - Envoy forty one twenty five.
		07:32:00.4 **APR**	affirmative.
		07:32:01.5 **RDO-2**	thanks.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:32:10.7 **HOT-2**	alright well - (we're) keepin it.		
07:32:11.0 **HOT-1**	I - I'll tell you what dude if you wanna go ahead and put - uh - Cincy in the flight plan somewhere.		
07:32:18.7 **HOT-2**	uhhh - ok one second.		
07:32:25.2 **HOT-2**	I'll do that as soon as - I don't want to screw up -		
07:32:28.8 **HOT-1**	yup.		
07:32:29.5 **HOT-2**	I'll do that when we ta - if we don't land.		
07:32:31.4 **HOT-1**	ok.		
07:32:34.4 **HOT-2**	if that's alright with you - I don't wanna -		
07:32:35.2 **HOT-1**	whatever you like man.		
07:32:36.7 **HOT-1**	they're gonna give us vectors to wherever anyway.		
07:32:39.3 **HOT-2**	yeah.		
07:32:41.1 **HOT-2**	same thing as before if we have to go around?		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:32:45.9 **HOT-1**	yup.		
07:32:46.0 **HOT-2**	course alive cross checked no flags.		
07:33:26.3 **HOT-2**	forty seven forty on the fuel.		
07:33:29.2 **HOT-1**	got it.		
07:33:30.0 **HOT-2**	bingo is * yep ***		
		07:33:59.1 **Envoy3551**	approach Envoy thrity five fifty one - seven thousand and foxtrot.
		07:34:02.8 **APR**	Envoy thirty five fifty one vectors runway one zero left the R V R is four thousand.
		07:34:06.8 **Envoy3551**	one zero left envoy thirty five fifty one.
07:34:10.7 **HOT-2**	at least we know we can see the runway.		
07:34:12.7 **HOT-1**	right.		
07:34:16.5 **HOT-1**	ah - if those winds are real we’re - they've gotten better - at thirteen gustin’ twenty five so if it’s really like thirteen and -		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:34:29.6 **HOT-1**	just a matter of how much snow is on the runway.		
07:34:31.9 **HOT-2**	yeah.		
07:35:04.6 **HOT-1**	alright well if anybody was # up on ten left maybe they were just plowin' it.		
07:35:08.2 **HOT-2**	yeah I think they were just - cause American so- American Skywest and us - American said hey this needs to be plowed.		
07:35:17.0 **HOT-2**	So I think that's just what -		
		07:35:22.6 **APR**	China freight one zero five five - uh - heavy the O'Hare altimeter is three zero two one.
07:35:29.1 **HOT-2**	two one.		
07:35:32.7 **HOT-1**	set crosschecked.		
07:35:35.1 **HOT-2**	set crosschecked.		
		07:36:14.7 **APR**	American four sixty six you're following a heavy jet caution wake turbulence Boeing triple seven.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		07:36:18.6 **American 466**	alright four sixty six.
07:36:21.3 **HOT-1**	well that's what you want to deal with today too.		
07:36:23.6 **HOT-2**	what.		
07:36:23.9 **HOT-1**	caution wake turbulence.		
07:36:25.1 **HOT-2**	oh yeah.		
07:36:27.8 **HOT-2**	glideslope alive.		
07:36:30.0 **HOT-1**	roger.		
07:36:46.2 **HOT-1**	set missed approach altitude v approach climb.		
07:36:51.4 **HOT-2**	set.		
07:37:17.8 **HOT-2**	sterile light on - landing P A complete - E F B is set - descent checklist is complete.		
07:37:22.8 **HOT-1**	thank you - that's the hardest thing to remember I think.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:37:25.5 **HOT-2**	the before landing.		
07:37:26.2 **HOT-1**	runnin all your # checklists again.		
07:37:27.7 **HOT-2**	yeah after - yeah that's the hardest thing.		
07:37:28.6	[sound of laughter]		
07:37:29.7 **HOT-1**	hah you're -		
07:37:30.6 **HOT-2**	youre mind's already set you're gonna land.		
07:37:32.0 **HOT-1**	yeah - right.		
07:38:31.9 **HOT-2**	nice thing is everyone already went to their alternate so it's pretty quiet.		
07:38:35.4 **HOT-1**	right.		
07:39:05.1 **HOT-1**	let's go gear down.		
07:39:06.7 **CAM**	[sound similar to gear extending]		
07:39:08.5 **HOT-1**	flaps twenty two.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:39:10.3 **HOT-2**	ground contact.		
07:39:12.3 **CAM**	[sound similar to flap handle]		
07:39:19.5 **HOT-1**	before landing checklist.		
07:39:21.9 **HOT-2**	landing gear three green -		
07:39:23.1 **HOT-1**	three green.		
07:39:23.1 **HOT-2**	speed brake - closed - thrust rating T O one [T O for take off] - flaps set twenty two - before landing checklist complete.		
		07:39:33.5 **RDO-2**	tower Envoy forty one twenty five BUGSY.
		07:39:36.0 **TWR**	Envoy forty one twenty five O'Hare tower the RVR is four thousand - RCC is 555 - braking medium to poor up to november 3 and (poor/four) past continue inbound landing clearance in a couple miles - traffic is holding in position.
		07:39:47.6 **RDO-2**	willco Envoy forty one twenty five.
07:40:13.4 **HOT-1**	alright comin back on the speed.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:40:22.0 **HOT-1**	can you rebug my pink speed?		
07:40:24.1 **HOT-2**	sorry I can't hear - what'd you say?		
07:40:25.3 **HOT-1**	can you rebug my pink speed?		
07:40:26.9 **HOT-2**	oh yeah.		
		07:40:27.9 **TWR**	Envoy forty one twenty five traffic's on the roll runway one zero left clear to land current winds three six zero at one seven gust two four.
		07:40:34.2 **RDO-2**	one zero left clear to land envoy fourty one twenty five.
07:40:36.2 **HOT-2**	thousand feet.		
07:40:37.5 **HOT-1**	roger.		
		07:40:37.6 **TWR**	O'Hare information Golf now current altimeter three zero two one.
07:40:42.5 **HOT-2**	set.		
07:40:45.4 **HOT-1**	thank you.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:41:08.5 **HOT-2**	five hundred feet.		
07:41:11.0 **HOT-1**	roger.		
07:41:11.1 **HOT-2**	sinking nine hundred v ref plus thirteen.		
07:41:15.3 **HOT-1**	woah #.		
07:41:24.4 **HOT-2**	continue.		
07:41:27.2 **HOT-1**	continuing.		
07:41:30.1 **CAM**	approaching minimums - autopilot - autopilot.		
07:41:32.2 **HOT-2**	runway in sight.		
07:41:33.7 **HOT-1**	roger - landing.		
07:41:34.7 **HOT-2**	thanks.		
07:41:37.2 **CAM**	minimums - minimums.		
07:41:44.3 **CAM**	one hundred - glideslope.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:41:47.6 **HOT-1**	yeah yeah.		
07:41:48.6 **CAM**	[sound similar with master caution]		
07:41:52.8 **HOT-2**	yaw damp off.		
07:41:54.4 **HOT-1**	roger.		
07:41:58.9 **CAM**	[sound similar to landing gear touching down]		
07:42:01.7 **HOT-2**	stay on that centerline.		
07:42:02.5 **HOT-1**	yep #.		
07:42:06.4 **HOT-1**	#.		
07:42:07.9 **CAM**	[sound similar to aircraft slowing down]		
07:42:12.1 **CAM**	[sound similar to engine thrust increasing]		
07:42:16.7 **HOT-1**	aww #.		
07:42:21.5 **CAM**	[sound similar to thrust levers being moved]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
07:42:24.6 **HOT-1**	# - ugh.		
07:42:26.9 **CAM**	[increase in background noise]		
07:42:29.7 **CAM**	[sound of triple chime - master warning] landing gear [master warning continues until the end of the recording]		
07:42:32.0 **CAM**	[sound similar to stick shaker]		
		07:42:32.1 **RDO-TWR**	Envoy forty - * -twenty five do you require assistance?
		07:42:34.1 **RDO-2**	* * need assistance Envoy forty one twenty five.
		07:42:37.1 **RDO-TWR**	roger envoy forty one twenty five we'll call em now***
07:42:38.5 **HOT-2**	thanks.		
08:05:50.8 **END OF TRANSCRIPT** **END OF RECORDING**			