

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



GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

DCA14FA058

By

Bill Tuccio, Ph.D.

WARNING

The reader of this report is cautioned that the transcription 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
Washington, D.C. 20594

August 7, 2014

Cockpit Voice Recorder

Group Chairman's Factual Report
By Bill Tuccio, Ph.D.

A. EVENT

Location:	Memphis, Tennessee
Date:	February 5, 2014
Aircraft:	Embraer S.A. EMB-145EP, N802HK
Operator:	Trans States Airlines LLC, Flight 3395
NTSB Number:	DCA14FA058

B. GROUP

A group was convened on June 4, 2016.

Chairman:	Dr. Bill Tuccio Aerospace Engineer National Transportation Safety Board
Member:	Albert Nixon Aviation Accident Investigator National Transportation Safety Board
Member:	Pat Hempen Air Safety Investigator Federal Aviation Administration
Member:	Captain Bill Haller Embraer Instructor Trans States Airlines
Member:	Captain Joe Ferris Trans States Airlines Central Air Safety Vice Chair Air Line Pilots Association
Member:	Dan Ramirez Air Safety Specialist Embraer Aircraft Holding, Inc.

C. SUMMARY

On February 5, 2014, about 0022 central standard time, N802HK, an Embraer S.A. EMB-145EP operated by Trans States Airlines LLC as a Title 14 *Code of Federal Regulations* Part 121 scheduled domestic passenger flight to Memphis, Tennessee, landed hard on runway 36R. Instrument meteorological conditions prevailed at the time of the accident, and an instrument flight rules flight plan was filed. The airplane incurred substantial damage. There were no injuries to the 3 flight crew members or 50 passengers aboard. The flight originated in Houston, Texas, the previous day, about 2022. A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board's Audio Laboratory for readout. The CVR group meeting convened and a partial transcript was prepared for the first 1-hour and 16-minutes of the event flight that was recorded on a 2-hour and 4-minute digital recording (see attached).

D. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division's Audio Laboratory received the following CVR:

Recorder Manufacturer/Model: **L-3/Fairchild FA2100-1020**
Recorder Serial Number: **0823**

Recorder Description

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. This model CVR, the L-3/Fairchild FA2100-1020, contains a 2-channel recording of the last 2 hours of operation and separately contains a 4-channel recording of the last 30 minutes of operation. The 2-hour portion of the recording is comprised of one channel of audio information from the cockpit area microphone (CAM) and one channel that combines three audio sources: the captain's audio panel information, the first officer's audio panel information, and the observer pilot's audio panel information and public address system. The 30-minute portion of the recording contains 4 channels of audio data: one channel for each flight crew, one channel for the CAM audio information, and a fourth channel for the public address and third crewmember.

Recorder Damage

Upon arrival at the audio 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.

Audio Recording Description

The accident flight was recorded on the 2-channel portion of the 2-hour 4-minute recording and consisted of two channels of audio information. The quality of channel 1

(combined audio from three sources) was excellent. The CAM channel was unusable and appeared inoperative.

Inoperative CAM Channel

After the accident, Trans States maintenance personnel reported the “CAM was found to be working but was very weak;” the microphone was removed and the solder connection “came apart on its own.” After the microphone was re-soldered, maintenance personnel reported the microphone worked properly. The microphone (figure 1) was sent to the NTSB Vehicle Recorder Division’s Audio Laboratory. The microphone was disassembled (figure 2) and evidenced corrosion (figure 3).

Figure 1. CAM as received by NTSB.



Figure 2. CAM disassembled.

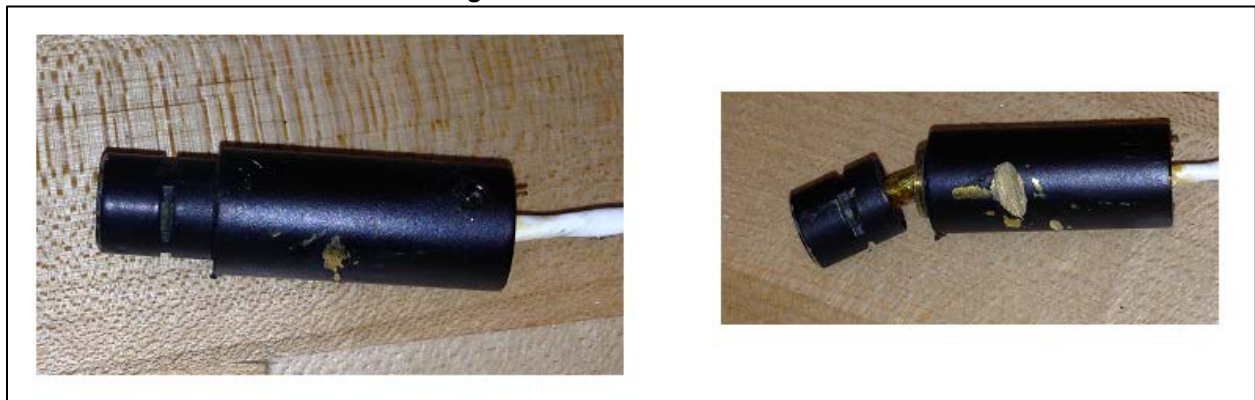
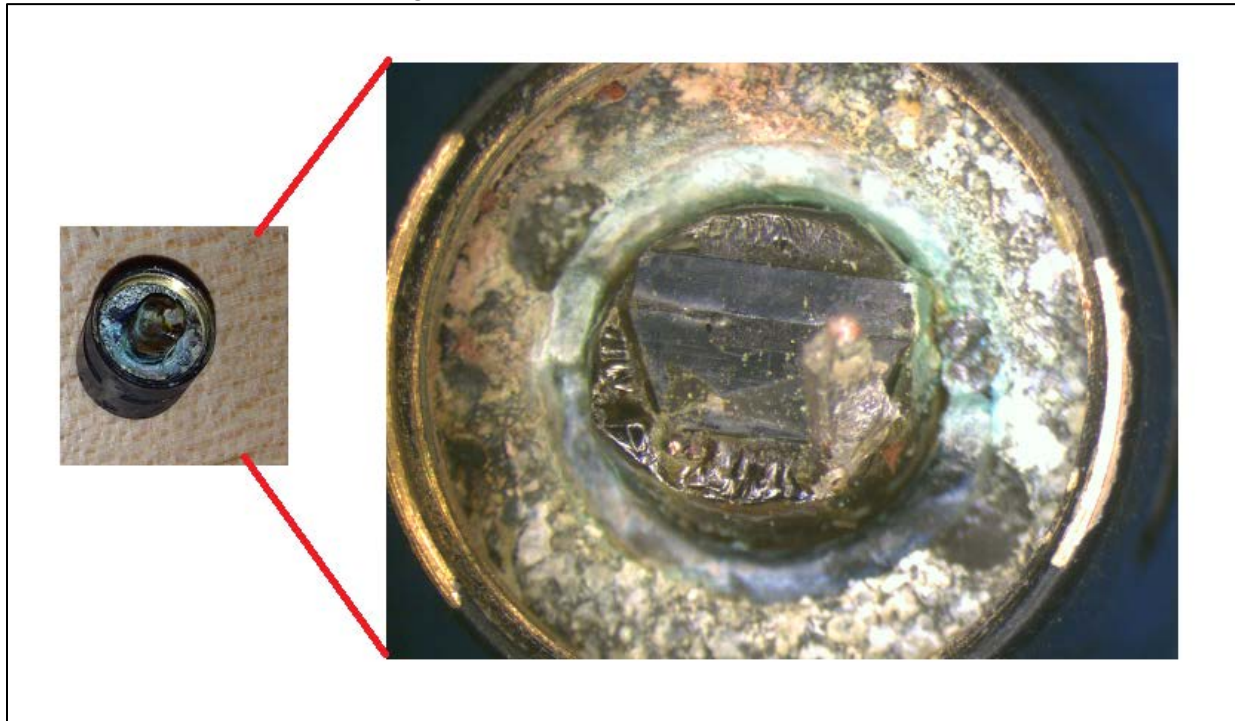


Figure 3. CAM evidence of corrosion.



According to Trans States Airlines, the CVR and CAM are checked via maintenance task number 23-71-00-700-801A at a 5,000 hour interval scheduled within Block 4C maintenance. The last time this task was performed was January 1, 2012, about 4,068 hours before the event. The two prior inspections were on December 19, 2009 and July 25, 2007. Trans States Airlines provided flight crew checklists related to testing CVR functionality by use of the CVR test button.

Relevant portions of maintenance task number 23-71-00-700-801A and Trans States flight crew checklists related to CVR testing are provided as Attachment 1 to this report.

Prior NTSB Recommendations Related to CVR Testing

In 1978 and 1990 the NTSB recommended that the FAA require proper testing of a CVR system before each flight (Safety Recommendations A-78-21 and A-90-70); these recommendations were classified as “Closed – Acceptable Action.” In 2002, the NTSB again recommended that the FAA require CVR functionality tests prior to the first flight of the day (Safety Recommendation A-02-25); this recommendation was classified as “Closed – Superseded” by Safety Recommendation A-06-23. Recommendation A-02-25 read, in part, “This test must be conducted according to procedures provided by the CVR manufacturer and shall include, at minimum, listening to the recorded signals of each channel to verify that the audio is being recorder properly, is intelligible, and is free from electrical noise or other interference.”

Recommendation A-06-23 to the FAA, currently classified as “Open – Unacceptable Response,” recommended:

Require all operators of aircraft equipped with a cockpit voice recorder (CVR) to (1) test the functionality of the CVR before the first flight of each day as part of an approved aircraft checklist and (2) perform a periodic maintenance check of the CVR as part of an approved maintenance check of the aircraft. The CVR preflight

test should be performed according to procedures provided by the CVR manufacturer and should include listening to the recorded signals on each channel to verify that the audio is being recorded properly, is intelligible, and is free from electrical noise or other interference. The periodic maintenance check of the CVR should include an audio test followed by a download and review of each channel of recorded audio. The downloaded recording should be checked for overall audio quality, CVR functionality, and intelligibility.

Timing and Correlation

The times used in this report are expressed as local time of the accident (CST).

Timing of the transcript was established by correlating the CVR events to common events on the flight data recorder (FDR) and then offsetting this value to local CST.

Radio transmissions made by the aircraft recorded on the 2-hour portion of the CVR at 1222.4, 1235.3, 1303.7, and 1313.5 CVR Elapsed Time (time in seconds from the start of the 2-hour recording) were correlated to the radio transmit microphone key parameter from the FDR at 194363.0703125, 194376.0703125, 194445.0703125, and 194454.0703125 FDR Subframe Reference Number (SRN). Each of the four radio transmissions acted as an anchor point for a linear interpolation. This linear interpolation resulted in 1222.4 CVR Elapsed Time = 194362.85 FDR SRN. Incorporating the relationships: (a) UTC = FDR SRN – 172238.0^{*}; (b) CST = UTC – 6 hours; and (c) allowing for a transition through midnight, the following relationship was developed:

$$\text{CVR CST} = \text{CVR Elapsed Time} + 23:48:22.45$$

Description of Audio Events

The recording began on February 4, 2014, at 2348:22 CST as Waterski 3395[†] was being vectored for an ILS approach to runway 36 left at MEM. Throughout the recorded flight, numerous aircraft (mostly Federal Express heavy arrivals) were communicating nearly continuously with Memphis Approach and Memphis Tower. Waterski 3395 missed the first approach to runway 36 left and was then radar vectored for an ILS approach to runway 36 right at MEM. After Waterski 3395 landed on runway 36 right, the transcript details CVR content until the aircraft arrived at the gate on February 5, 2014, at 0104:59 CST[‡] and power was removed from the CVR.

Power was re-applied to the CVR at an undetermined time resulting in 49 minutes of additional recorded content (and the associated loss of 49 minutes of content prior to February 4, 2014, at 2348:22 CST). This additional recorded content was not pertinent to the investigation and was not further summarized or transcribed.

Since the CAM recording was unusable, some cockpit discourse and sounds may not have been recorded.

As part of the Safety Board's accident investigation process, the flight crew was invited to review the CVR recording and transcript and suggest corrections or additions. On August 6, 2014, the flight reviewed the CVR transcript and had no comments.

^{*} See the FDR Specialist's Factual Report in the public docket for this investigation.

[†] Waterski was the air traffic control call sign used by Trans States Airlines LLC.

[‡] The recording continued through midnight.

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 L-3/Fairchild FA2100-1020 solid-state cockpit voice recorder, serial number 0823, installed on a Trans States Airlines LLC Embraer 145EP (N802HK), which experienced a hard landing at the Memphis International Airport, Memphis, Tennessee.

LEGEND

HOT	Flight crew audio panel voice or sound source
RDO	Radio transmissions from N802HK
NAV	Radio navigation reception
GND	Radio transmission from the Memphis airport Ground controller
TWR-A	Radio transmission from the first Memphis airport Tower controller
TWR-B	Radio transmission from the second Memphis airport Tower controller
APR-A	Radio transmission from the first Memphis Approach controller
APR-B	Radio transmission from the second Memphis Approach controller
AWU	Aural Warning Unit
ATIS	Automatic Terminal Information Service
FX1387	Radio transmission from Federal Express flight 1387
AC-MISC	Radio transmission from unidentified aircraft
-1	Voice identified as the captain
-2	Voice identified as the first officer
-3	Voice identified as a flight attendant
-4	Voice of ground personnel
-?	Voice unidentified
*	Unintelligible word
#	Expletive
()	Questionable insertion
[]	Editorial insertion

Note 1: Times are expressed in central daylight time (CST).

Note 2: Generally, only radio transmissions to and from the accident 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 CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

February 4, 2014 23:48:22.5 CST

START OF RECORDING

START OF TRANSCRIPT

23:48:24.6

HOT-1 so what did he say. FREAZ.

23:48:27.1

HOT-2 he said FREAZ at or above four.

23:48:27.3

HOT-1 which is fourteen.

23:48:29.9

HOT-1 that's in six miles.

23:48:31.4

HOT-2 yeah.

23:48:38.3

HOT-2 cause it's. MACEE is four point two from FREAZ. so
when I'm four point two from MACEE.

23:48:44.6

HOT-1 yeah.

23:48:45.4

HOT-2 start **. and by then I should have a solid.

23:48:50.6

HOT-1 ah uh ah [mumbling].

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

23:48:50.7

HOT-2 you don't have the uh.

23:48:51.4

HOT-1 I still. * go. it's goin'. it's jumpin' in and out. so I don't know what's goin' on.

23:48:57.3

HOT-1 we'll go all the way to cleatus. if it. err. CADUS. if it doesn't stay on then I (think) we'll have to.

23:49:17.8

HOT-2 do you mind if I just go flaps nine since you're up there?

23:49:20.1

HOT-1 yeah go ahead.

23:49:20.7

HOT-2 alright. flaps nine.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

23:49:03.6

APR-A Waterski thirty three ninety five reduce speed to one niner zero knots to FREAZ. one seven zero knots to CADUS. contact Memphis Tower now one two eight point four two.

23:49:10.3

RDO-1 alright one. one ah ninety to FREAZ. one seventy till CADUS. over to tower Waterski thirty three ninety five.

23:49:25.1

RDO-1 Tower Waterski thirty three ninety five ILS three six left.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

23:49:42.0
HOT-2 you still don't have a localizer over there do you?

23:49:45.8
HOT-1 there it is but. [exhale]. there it went.

23:49:48.0
HOT-2 yep there it goes.

23:49:55.4
HOT-1 alright stay on long range. and then. you see my
glideslope?

23:49:58.2
HOT-2 I'll stay--.

23:49:59.7
HOT-2 yeah.

23:50:01.0
HOT-1 follow it down. if we don't have anything by...CADUS
we'll go around and then we'll...we'll ask for the center I
guess.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

23:49:28.5
TWR-A Waterski thirty three ninety five Memphis Tower wind two eight zero at
eight runway three six left cleared to land. caution wake turbulence six
and half miles in trail of a heavy MD-eleven.

23:49:36.8
RDO-1 three six left ah cleared to land Waterski thirty three ninety five.

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
23:50:05.7 HOT-2	alright.		
23:50:16.6 HOT-1	there's fourteen.		
23:50:17.0 HOT-2	then he said one seventy. so slowin' down some. headed down to three thousand.		
23:50:24.7 HOT-1	damn. come on.		
23:50:25.4 AWU	[sound of triple buzzer, similar to altitude alerter]		
23:50:28.4 HOT-2	this is the last thing (you) want to do tonight.		
23:50:31.6 HOT-1	go around?		
23:50:32.4 HOT-2	yeah.		
23:50:33.9 HOT-1	yes it is.		
23:50:35.9 HOT-1	hopin' something is just.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
23:50:38.3 HOT-1	like the MD-eleven is blockin' something. I don't know what the # is goin' on.		
23:50:45.3 HOT-2	I don't know [whispering].		
23:50:48.6 HOT-2	slowing.		
23:50:49.0 HOT-1	alright. let's ah go to heading.		
23:50:52.2 HOT-2	okay.		
23:50:54.3 HOT-1	and then.		
23:50:55.2 HOT-2	you want me to go into nav?		
23:50:56.2 HOT-1	yeah.		
23:50:57.1 HOT-2	alright let's see if it works.		
23:51:00.8 HOT-2	ahh your's went away too.		
23:51:04.4 HOT-1	alright hit it.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
23:51:21.4 HOT	[sound of lip smacking]		
23:51:27.0 HOT-1	well that's the longest it's stayed on so far so hopefully we might be good.		
		23:51:38.5 NAV	[sound of navigational identifier begins "dot dot dash dash dash dot dot dot dot dash dot," and continues for about 15 seconds]
23:51:38.9 HOT-1	it's goin' everywhere.		
23:51:47.9 HOT-2	it's doin' it's typical clearin'.		
23:51:51.0 HOT-1	yeah. we're gonna'. I don't think we're going to be able to do this.		
23:51:52.3 HOT-2	if I have to I'll--		
23:51:56.1 HOT-2	you want me to take it off autopilot?		
23:51:59.4 HOT-1	yeah.		
23:52:02.1 AWU	autopilot.		

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

23:52:03.9

AWU autopilot.

23:52:05.7

AWU autopilot.

23:52:09.9

HOT-1 (it's) gotta' good signal.

23:52:11.9

HOT-2 I don't know what its deal is.

23:52:14.8

HOT-2 CADUS is our final approach fix correct?

23:52:16.8

HOT-1 correct.

23:52:17.6

HOT-2 alright.

23:52:24.4

HOT-2 gear down.

23:52:25.3

HOT [sound of click, similar to gear handle]

23:52:25.8

HOT-2 and twenty two please.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

23:52:02.5

NAV

[sound of navigational identifier begins "dot dot dash dash dash dot dot dot dot dash dot," and continues for about 15 seconds]

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>
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23:52:28.1 HOT-1	gear down twenty two selected.
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23:52:44.4 HOT-1	that looks a little bit more stable.
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23:52:47.1 HOT-2	a little bit not. nope [emphasized "nope"].
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23:52:48.4 HOT-1	oh there it goes. let's. let's go around.
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23:52:50.7 HOT-2	you want to go around?
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23:52:51.3 HOT-1	yeah.
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23:52:51.7 HOT-2	alright.
----------------------------	----------

23:52:52.8 HOT-2	go around. set max thrust. flaps nine.
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23:52:59.6 HOT-1	positive climb.
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23:53:00.4 HOT-2	gear up.
----------------------------	----------

23:53:01.7 HOT	[sound of click, similar to gear handle]
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<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
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**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

23:53:24.1
HOT-2 turnin' to two seven oh. * three thousand.

23:53:25.0
HOT-1 alright there's acceleration height.

23:53:27.3
HOT-2 alright flaps zero. climb sequence.

23:53:36.2
HOT-1 did he say to talk to someone else?

23:53:38.1
HOT-2 I don't know what he said.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

23:53:03.1
RDO-1 Tower Waterski thirty three ninety five we are going around. [sound of three buzzers, similar to altitude alert] runway three six left. we don't have a very good signal on the localizer. it's taking us everywhere goin' in and out.

23:53:12.4
TWR-A Waterski thirty three ninety five cancel your approach clearance. turn left heading two seven zero and climb and maintain three thousand.

23:53:19.8
RDO-1 climb to three thousand left turn to two seven zero Waterski thirty three ninety five.

23:53:39.9
RDO-1 did you want us to stay with you or go over to ah someone else?

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

23:54:47.9
HOT-2 I mean we're at the final approach fix. and it went out again so.

23:54:51.8
HOT-1 ahh it's going like way out (there) *.

23:55:10.1
HOT-2 alright you want to let her know *.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

23:53:42.7
TWR-A Waterski thirty three ninety five contact Memphis Approach one two six point seven.

23:53:48.2
RDO-1 two six point seven Waterski thirty three ninety (five).

23:54:20.4
RDO-1 Approach Waterski thirty three ninety five three thousand heading of two seven zero. we (just ah) the localizer for two six left for some reason we weren't keepin' it. uh. up.

23:54:31.9
APR-B Waterski thirty three ninety five roger I'll contact the tower and see what they have to say. maintain ah three thousand.

23:54:37.0
RDO-1 maintain three thousand. can we try the center?

23:54:40.0
APR-B Waterski thirty three ninety five I'll see if I can get it for you.

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
		23:55:11.6 APR-B	Waterski thirty three ninety five turn left heading one eight zero.
23:55:12.4 HOT-1	yeah.		
		23:55:14.1 RDO-1	left turn to one eight zero Waterski thirty three ninety five.
23:55:17.5 HOT-2	one eighty on the heading.		
23:55:20.5 HOT-1	(you wanna") do an after take-off.		
23:55:21.6 HOT-2	yeah. I see up and zero. after takeoff checklist.		
23:55:24.1 HOT-1	gear's up. flap's zero. bleeds and packs are still off the or off the er engines. pressurization is checked. thrust rating is climb.		
23:55:37.5 HOT-1	(cross feed is off).		
23:55:42.5 HOT-1	[sound of click]		
23:55:49.0 HOT-3	what's the matter.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
23:55:50.6 HOT-2	[laugh]		
23:55:51.8 HOT-1	I don't know. we can't. there was somethin' wrong with our ah signal to land so we're gonna' go try a different runway.		
23:55:58.5 HOT-3	oh okay.		
23:55:59.5 HOT-1	alright.		
23:55:59.7 HOT-3	alright.		
23:56:01.1 HOT-1	alright thanks.		
23:56:01.9 HOT-3	mm hmm.		
23:56:06.4 HOT-1	there's too many # airplanes around here. that's what's wrong.		
23:56:09.1 HOT-2	that's exactly what's wrong. alright it's goin' back on autopilot.		
23:56:12.6 HOT-1	okay.		

TIME and
SOURCE **INTRA-AIRCRAFT CONTENT**

23:56:14.5
HOT [sound of click]

23:56:15.2
HOT-2 keepin' it--

23:56:15.3
HOT-1 I'm just gonna' throw.

23:56:17.3
HOT-1 what was the center?

23:56:19.1
HOT-2 ahhh.

23:56:19.7
HOT-1 ten five.

23:56:20.9
HOT-1 just gonna' put it down here in case he lets us do that.

23:56:22.8
HOT-2 yeah.

23:56:24.1
HOT-2 ten five.

TIME and
SOURCE **AIR-GROUND COMMUNICATION CONTENT**

23:56:25.2
APR-B Waterski thirty three ninety five reduce speed to one seven zero.

23:56:25.2
HOT-2 **,

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

23:56:36.8
HOT-2 alright. one seventy flaps nine.

23:56:40.6
HOT [sound of click, similar to flap handle]

23:56:41.1
HOT-2 thanks.

23:56:49.0
HOT-1 well I don't know what the # to do then.

23:57:00.0
HOT-2 we weren't picking up the localizer on the other side.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

23:56:28.9
RDO-1 slow to one seven zero Waterski thirty three ninety five. any word on what runway we're gonna' do this time?

23:56:33.2
APR-B Waterski thirty three ninety five I'm still trying to coordinate for you.

23:56:35.8
RDO-1 alright thanks.

23:56:45.4
APR-B Waterski thirty three ninety five unable (on middle) runway.

23:57:03.1
RDO [sound of statics, similar to ACARS static]

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
23:57:05.7 HOT-2	*** [unintelligible due to overlapping ATC call to another aircraft]		
23:57:11.1 HOT-1	go with that.		
23:57:12.8 HOT-2	alright. as previously briefed. we'll try this again.		
		23:57:32.9 APR-B	Waterski thirty three ninety five are you having any fuel issues?
23:57:35.3 HOT-2	not yet.		
		23:57:37.1 RDO-1	no we're good for now. but ah if we can't pick it up we'rrre gonna' need the center. we're gonna' try at least.
		23:57:43.5 APR-B	Waterski thirty three ninety five roger.
23:57:54.1 HOT-1	ahhh pup-pup-pup. Little Rock.		
		23:57:55.9 APR-B	FedEx thirteen eighty seven turn right heading three three zero intercept three six left localizer. sorry for the late turn.
		23:58:03.1 APR-B	FedEx thirteen eighty seven are you correcting to the airway ah three six left localizer?

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
23:58:04.5 HOT-1	alright our alternate was sixteen twenty eight fuel burn.		
		23:58:05.9 FX1387	affirmative. thirteen eighty seven.
23:58:09.8 HOT-1	plus eighteen hundred would be two thirty four twenty eight.		
23:58:12.3 HOT-2	I think they just asked another one of the FedEx guys if they are correcting to the localizer.		
23:58:17.6 HOT-2	so obviously they're--.		
		23:58:32.3 AC-MISC	[garbled transmission, similar to two aircraft speaking at once]
23:58:39.9 HOT-2	blocked.		
		23:58:40.7 APR-B	FedEx thirteen eighty seven heavy turn left heading zero three correction three three zero and intercept the runway three six left localizer.
		23:58:46.0 FX1387	okay we're intercepting the localizer FedEx thirteen eighty seven.
23:58:57.0 HOT-2	if they keep this # up.		

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

23:59:04.6
HOT-2 yep.

23:59:14.3
HOT-2 alright now the right side.

23:59:15.4
HOT-1 'leven thirty five.

23:59:20.3
HOT-1 same course and ah.

23:59:22.8
HOT-2 same course. same uhm...high points. if we have to go missed again. climb to one thousand. right turn to five thousand or whatever they tell us. uhm. any questions?

23:59:38.0
HOT-1 ah decision altitude is five thirty five. we have...

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

23:59:01.8
APR-B Waterski thirty three ninety five would you like to try the right side?

23:59:05.0
RDO-1 yeah we'll try the right side Waterski thirty three ninety five.

23:59:07.8
APR-B Waterski thirty three ninety five change your landing runway expect runway three six right.

23:59:12.8
RDO-1 three six right thanks.

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>
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23:59:40.9 HOT-2	five thirty five.
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23:59:58.5 HOT-2	okay. so.
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23:59:59.7 HOT-1	** we're at one seventy so.
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00:00:03.2 HOT-2	why are they dicking us around tonight? I understand they got FedEx * but this is ridiculous.
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<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
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23:59:41.8 APR-B	Waterski thirty three ninety five ah descend and maintain two thousand you'll be exiting the Bravo.
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23:59:46.8 RDO-1	alright descend to two thousand Waterski thirty three ninety five. what did you say about exit?
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23:59:51.9 APR-B	Waterski thirty three ninety five you just now exited the Bravo at two thousand you'll be out of the Bravo.
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23:59:57.4 RDO-1	roger.
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<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:00:09.7 HOT-1	what if it's like this every night at this time. [chuckle]		
00:00:10.3 AWU	[sound of three buzzers, similar to altitude alert]		
00:00:13.1 HOT-1	I just never noticed it because we're never here this late.		
00:00:15.8 HOT-2	alright we'll stay under two hundred knots I guess is what he was saying.		
00:00:34.7 HOT-1	[inhale]		
00:00:36.4 HOT-1	[exhaling] (is that right). * HADAN and MCGHE.		
00:00:40.2 HOT-2	yep.		
00:00:50.5 HOT-1	# me [whispering].		
00:00:52.6 HOT-2	I know right.		
00:00:55.0 HOT-1	I was trying to get.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:01:00.6 HOT-1	tell company (but).		
		00:01:47.4 APR-B	Memphis Airport information Golf is current. altimeter's two niner niner niner.
00:01:51.4 HOT-2	niner niner niner. (alright).		
00:01:55.4 HOT-?	[exhale]		
00:02:24.0 HOT-1	seven twenty [whispering].		
		00:02:39.6 RDO	[sound of static, similar to ACARS static]
00:02:40.0 HOT-2	well if they keep messin' around with us (then). keep going out this direction **.		
00:02:50.0 HOT-1	# I don't know.		
00:02:55.5 HOT-1	if this doesn't pick (up) and we have to go around again we're goin' to Little Rock.		
00:02:59.4 HOT-2	will we have enough gas (for) Little Rock?		

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:03:01.4

HOT-1 yeah.

00:03:04.1

HOT-1 we just ah.

00:03:18.4

HOT-1 just wanna' make sure its.

00:03:23.1

HOT-1 broken at nine hundred over there. I mean if it's something wrong with our...

00:03:29.1

HOT-1 * supposed to be overcast at fifteen *. by two o'clock in the morning **.

00:03:39.9

HOT-2 I mean we could do the GPS. is there a GPS approach into the. something. depending on (oh God).

00:03:46.2

HOT-1 yeah but it's not gonna' get us down low enough here.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:02:59.4

APR-B Waterski thirty three ninety five turn left. left turn heading zero niner zero.

00:03:06.2

APR-B Waterski thirty three ninety five left turn heading zero niner zero.

00:03:09.1

RDO-1 left turn zero nine zero Waterski thirty three ninety five.

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:03:55.2 HOT-2	alright.		
00:03:56.0 HOT-1	they have an RNAV to two seven...and ssss left.		
		00:04:02.3 APR-B	Waterski thirty three ninety five turn left heading zero two zero intercept the runway three six right [emphasizes "right"] localizer.
		00:04:07.1 RDO-1	zero two zero intercept two six right Waterski or three six right Waterski thirty three ninety five.
		00:04:12.8 APR-B	Waterski thirty three ninety five caution wake turbulence you'll be five miles in trail of a heavy MD-eleven.
		00:04:18.1 RDO-1	roger.
00:04:19.5 HOT-1	and. I'm not picking it up yet.		
00:04:22.3 HOT-1	and. uh. the RNAV only. we need three quarters of a mile [exhale]. and it's not gonna' get us down low enough to get under the.		
00:04:35.4 HOT-1	#.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:04:38.3 HOT-2	okay.		
00:04:39.2 HOT-1	and. I wanted to see something real quick. I know that's not comin' in but.		
		00:04:44.8 APR-B	Waterski thirty nine. thirty three ninety five. ah disregard.
00:04:49.2 HOT-1	just want to throw in the center real quick as we pass it. and just see.		
00:04:57.4 HOT-1	we've got the glideslope on (the) center. but no localizer.		
00:05:13.3 HOT-2	okay.		
00:05:18.1 HOT-2	[exhale]		
00:05:20.2 HOT-1	do I have a glideslope on that side [sound of static, similar to ACARS static]. yes.		
00:05:27.5 HOT-1	so we'll do what we did last time. we'll...do it long range...		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>
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00:05:30.3
HOT-2 alright.

00:05:30.5
HOT-1 until we get close and.

00:05:49.5
HOT-2 alright it's nav-ed up.

00:05:52.6
HOT-1 I've got it in. and it's. I've got it. steady.

00:05:52.8
HOT-2 (come'n in) [low volume].

00:05:57.1
HOT-2 alright.

<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
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00:05:31.7
APR-B Waterski thirty three ninety five cross HADAN correction you are ah one two miles from HADAN cross HADAN two thousand cleared ILS runway three six right [emphasis on "right"] approach. * maintain one zero knots until HADAN.

00:05:42.0
RDO-1 alright cleared ILS three six right approach and ah two thousand till HADAN Waterski thirty three ninety five.

00:05:55.3
NAV [navigational identifier, low volume, static; continues and gets stronger for next 9 minutes becoming dot dot, dash dash, dash dot dash dash, dash dash dash]

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:05:59.1 HOT-1	so keep it long range ** [cut off by overlapping ATC communication to another FedEx flight]		
00:06:01.7 HOT-2	I'm gonna' keep it long range till we pass HADAN.		
00:06:04.4 HOT-1	okay.		
00:06:29.2 HOT-2	nope. look at it. it's gone. again.		
		00:06:35.9 APR-B	Waterski thirty three ninety five contact Memphis Tower now ["now" emphasized] on one one niner point seven.
		00:06:43.1 RDO-1	one one nine point seven [sound of chirp, similar to ACARS static] Waterski thirty three ninety five.
00:06:48.2 HOT-2	we're still kind'a far out though. so.		
		00:06:50.6 APR-B	Waterski thirty three ninety five cont--...** seven.
		00:06:54.5 RDO-1	one one nine point seven.
00:07:00.0 HOT-1	it went out.		

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:07:00.8

HOT-2 I know.

00:07:02.6

HOT-1 # [whispered].

00:07:09.9

HOT-2 I mean it comes right down to an emergency situation.
where if you've got a glideslope and I've got this. I'll
follow this.

00:07:17.7

HOT-2 and a glideslope. I don't know.

00:07:20.6

HOT-2 it's really I mean that's that's what what it's gonna'
come down to.

00:07:38.4

HOT-1 phhh-puh [exhaling].

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:07:22.6

RDO-1 Tow-- Tower Waterski thirty three ninety five ah we're with you on the
ILS to three six right. we're still not picking up the localizer just yet. ah.
what's the ceiling?

00:07:34.5

TWR-B Waterski thirty three ninety five ah ceiling reported four hundred
overcast.

00:07:40.1

RDO-1 and visibility.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:08:00.6
HOT-1 #. I'm going (to try something real quick).

00:08:05.5
HOT-1 I don't I I don't get any of 'em.

00:08:09.5
HOT-2 are you getting a glideslope?

00:08:11.1
HOT-1 I'm getting a glideslope for...all of 'em but not the loc.

00:08:17.3
HOT-1 if I go to m-...I guess we can go to Little Rock and shoot a GPS approach.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:07:41.5
TWR-B visibility half mile.

00:07:43.8
RDO-1 roger.

00:07:46.7
TWR-B Waterski thirty three ninety five Memphis Tower caution wake turbulence. six miles in trail of a heavy MD eleven wind two seven zero at one one. runway three six right cleared to land. RVR more than six thousand.

00:07:57.3
RDO-1 three six right. cleared to land. Waterski thirty three ninety five.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:08:21.7

HOT-2 I mean like that's the only option we have. I mean we can continue this but--

00:08:42.3

HOT-2 no.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:08:25.1

TWR-B Waterski thirty three ninety five informational only you're entering the ah Bravo airspace again and also and if if you're not ah receiving the localizer can you accept an RNAV three six right approach?

00:08:36.6

RDO-1 ah the visibility's too low.

00:08:39.1

TWR-B okay. alright. are you guys ah doin' alright on the ILS or...

00:08:43.0

TWR-B ...do we need to have a backup plan here?

00:08:44.9

RDO-1 ah looks like we're going to have to have a backup plan. we're gonna' probably divert to Little Rock.

00:08:49.3

TWR-B Waterski thirty three ah ninety five roger. maintain two thousand and let me know if you ah don't get the localizer here at ah the step down.

00:08:57.7

RDO-1 alright we'll maintain two thousand for now ah. it's comin' in. I've got it in right now. it's just for some reason we can't hold it.

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:09:05.8 HOT-2	alright. we're stayin' right here at two thousand. HADAN.		
00:09:11.3 HOT-1	it's it's on [exhale].		
00:09:14.6 HOT-2	ahhhh I don't want to go (around)-- [whispering].		
00:09:16.1 HOT-1	yeah if we go around we're goin' straight to Little Rock.		
00:09:17.7 HOT-2	we have to. 'cause I mean look at our fuel.		
00:09:22.0 HOT-1	thirty four was wh-what I'd figured out with the bug out.		
00:09:25.2 HOT-2	mm-hmm.		
00:09:25.9 HOT-1	but ah. approach and then eighteen hundred for reserve. but.		
00:09:33.1 HOT-2	we're okay now. but.		
00:09:35.2 HOT-2	(man) [whispering].		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>
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00:09:36.1
HOT-1 [exhale]

00:10:00.4
HOT-2 how is yours doin'?

00:10:02.1
HOT-1 it's holdin'.

00:10:03.1
HOT-2 it's holdin'?

00:10:03.8
HOT-1 yeah.

<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
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00:10:03.9
TWR-B Waterski thirty three ninety five how you doin'?

00:10:06.2
RDO-1 yeah we're doin' good. it's holdin' (right) now. we're gonna' try to shoot it.

00:10:09.5
TWR-B Waterski thirty three ninety five seven and a half from MCGHE cleared ILS three six right approach. maintain one seven zero knots until MCGHE.

00:10:15.9
RDO-1 one seventy till MCGHE cleared for the ILS three six right. Waterski thirty three ninety five.

00:10:19.6
HOT-2 alright [exhaling].

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:10:21.5 HOT-1	cleared to land.		
00:10:22.5 HOT-2	cleared to land. cleared for the approach. now let's see if George can figure it out.		
00:10:23.7 HOT-1	loc's captured.		
00:10:39.8 HOT-1	*.		
00:10:43.0 HOT-1	let's leave (it) in autopilot.		
00:10:44.7 HOT-2	will do b--.		
00:10:45.5 HOT-1	just wanna' see.		
00:10:59.4 HOT-2	it's having a hard time with the wind. but I think it'll be okay.		
00:11:34.3 HOT-2	are we gettin' ice now?		
00:11:36.8 HOT-1	[exhale] a little bit.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:11:39.9 HOT-2	what the # is it doin'.		
00:11:43.5 HOT-2	it's not. the. the.		
00:11:48.7 HOT-2	errrrr. George is having a really hard time.		
00:11:51.7 HOT-1	yep.		
00:12:05.8 HOT-2	you want me to keep it on autopilot. kick it out?		
00:12:07.9 HOT-1	yeah. just keep it in autopilot if it's not gonna' hold. then we're gonna' we're gonna' go missed right here in a minute. I just want to see. once we get.		
00:12:15.7 HOT-1	I-I want it to catch the glideslope.		
00:12:18.3 HOT-2	yeah.		
00:12:18.6 HOT-1	and see if it's trackin' the *--.		
00:12:19.4 HOT-2	you want me to drop gear and stuff?		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:12:21.1 HOT-1	yeah.		
00:12:21.7 HOT-2	alright. gear down.		
00:12:24.0 HOT	[sound of click, similar to gear handle]		
00:12:26.4 HOT-2	twenty two.		
00:12:28.1 HOT-1	gear down. twenty two selected.		
00:12:36.9 HOT-1	I got a strong # signal.		
00:12:41.8 HOT-1	glideslope's captured.		
00:12:48.2 HOT-2	flaps forty five.		
00:12:49.3 HOT-1	forty five selected.		
00:13:00.9 HOT-2	I see down and forty five. before landing checklist.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:13:03.5 HOT-1	flight attendant's notified. landing gear's down. flaps forty five. speed brake's closed. crossfeed's off. (before landing's complete) [spoken rapidly].		
00:13:27.6 HOT-1	thousand to go.		
00:14:00.7 HOT-1	a little ground contact.		
00:14:04.0 HOT-2	okay.		
00:14:19.6 HOT-1	there's two hundred.		
00:14:22.2 HOT-2	you're outside?		
00:14:23.2 HOT-1	yep.		
00:14:23.9 HOT-2	(good). alright.		
00:14:31.8 HOT-2	one hundred.		
00:14:32.7 HOT-1	alright runway is about one o'clock.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>
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00:14:34.9 AWU	autopilot.
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00:14:35.3 HOT-2	auto's off.
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00:14:36.4 HOT-2	got it.
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00:14:36.7 AWU	autopilot.
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00:14:36.8 HOT-2	continuing. landing.
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00:14:37.5 HOT-1	# me [whispering].
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00:14:38.5 AWU	autopilot.
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00:14:39.6 HOT-2	shut the # up you stupid thing.
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00:14:40.2 AWU	autopilot.
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00:14:41.8 AWU	autopilot.
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00:14:41.9 AWU	two hundred.
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<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
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<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:14:42.9 HOT-2	why is she not shutting up?		
00:14:43.8 AWU	autopilot.		
00:14:45.5 AWU	autopilot.		
00:14:48.0 HOT-1	alright.		
		00:14:49.0 TWR-B	wind two eight zero at one three gust one seven.
00:14:50.1 AWU	one hundred.		
00:14:50.2 HOT-1	(speed) [spoken at same time as AWU "one hundred" and Tower wind related radio transmission]		
00:14:51.8 HOT-2	correcting.		
00:14:58.8 HOT-1	twenty feet.		
00:15:00.6 HOT-2	oh #.		
00:15:01.0 HOT	[sound of rattle (for about 2.0 seconds)]		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:15:01.1 AWU	bank angle. bank angle.		
00:15:01.5 HOT-2	#.		
00:15:03.2 AWU	[sound of three chimes, similar to master warning]		
		00:15:04.3 RDO	[sound of static, similar to ACARS static]
00:15:04.7 HOT-1	* the #.		
00:15:04.7 AWU	takeoff...		
00:15:05.5 HOT-2	what the hell just happened.		
00:15:06.3 AWU	...flaps.		
00:15:07.2 HOT-1	my controls.		
00:15:08.0 AWU	[sound of three chimes, similar to master warning]		
00:15:08.1 HOT-2	your controls.		

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:15:09.3
HOT [sound of rattling]

00:15:12.2
HOT-2 what just happened?

00:15:12.9
HOT [sound of three chimes, similar to master warning]

00:15:14.0
HOT [sound of rattling]

00:15:15.9
HOT-1 rudder system one and two inop.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:15:10.2
RDO [sound of static, similar to ACARS static]

00:15:18.9
RDO [sound of static, similar to ACARS static]

00:15:19.2
RDO-1 [breathing heavy] Tower Waterski thirty three ninety five. [sound of static, similar to ACARS static] we had a rudder problem right at about forty feet. we have landed and uh. [exhale] we had a pretty hard landing.

00:15:34.7
TWR-B can you clear the runway?

00:15:36.5
RDO-1 I think so.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:15:38.8
AWU [sound of single chime, similar to master caution]

00:15:50.5
HOT [sound of heavy breathing]

00:15:58.6
HOT-2 I had no (rudder).

00:16:03.1
HOT-1 # [whispering].

00:16:03.5
HOT-2 like I had nothing. I had no.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:15:37.8
TWR-B Waterski thirty three ninety five you are at Papa?

00:15:41.8
RDO-1 we are at Sierra Three.

00:15:43.2
TWR-B alright. left at Sierra Three. cross runway three six center at Lima and taxi straight into the ramp this frequency. I have traffic within two miles.

00:15:55.1
RDO-1 alright did you say Sierra Three.

00:15:57.4
TWR-B [Instructs Fedex 1378 Heavy to go around due to traffic on the runway. Fedex acknowledges go around.]

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:16:05.8
HOT-1 yep. you had rudder system one and two ("went" or "inop" or "in").

00:16:14.8
HOT-2 no.

00:16:21.4
HOT-1 dude.

00:16:22.5
HOT-2 I have never in my life.

00:16:27.2
HOT-2 I. I had nothin'.

00:16:28.8
HOT-1 [exhale].

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:16:07.2
TWR-B Waterski thirty three ninety five affirmative. left at Sierra Three cross runway three six center at Lima and taxi into the ramp. you need any other assistance?

00:16:15.8
RDO-1 a just give us a second real quick.

00:16:38.1
RDO-1 do we stop before we cross three six center?

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:17:14.1
HOT-2 did we drop a wing?

00:17:15.8
HOT-1 ("oh" might be "no") [whispering].

00:17:20.9
HOT-2 I'm pretty sure we had a.

00:17:26.9
HOT-3 yes.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:16:40.8
TWR-B Waterski thirty three ninety five roger you can hold short of runway three six center at Lima. and exactly what was it again? you said you had a rudder problem at about forty feet?

00:16:50.1
RDO-1 yeah we had a rudder ah I think it was almost a hard over. and ah. we lost control there for a second. had a really hard landing. and then almost went off the side but we...regained it and. we're just a little shaken here real quick.

00:17:03.9
TWR-B Waterski thirty three ninety five roger. hold short of runway three six center at Lima and do you think for any reason I need to have the runway swept?

00:17:12.0
RDO-1 negative.

00:17:12.9
TWR-B roger.

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:17:27.6 HOT-1	is everything alright back there?		
00:17:29.2 HOT-3	yes. I think so.		
00:17:30.3 HOT-1	everybody alright?		
00:17:31.5 HOT-3	***.		
00:17:38.6 HOT-1	I think we had a rudder hardover and when we stamped on the left rudder.		
00:17:43.0 HOT-2	* for the wind correction because we had some wind.		
00:17:46.0 HOT-1	but. you know when it jerked to the right.		
00:17:47.5 HOT-2	yeah.		
00:17:48.2 HOT-1	I think we stepped on the left rudder. which knocked the rudder system off.		
00:17:52.7 HOT-1	pretty sure we had a hard-- [sound of hi-lo chime, similar to flight attendant call to flight deck] a rudder hardover.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:17:56.2 HOT-1	yeah.		
00:17:56.7 HOT-3	hey.		
00:17:57.8 HOT-1	everything okay?		
00:17:58.6 HOT-3	yes.		
00:17:59.1 HOT-2	good.		
00:18:00.1 HOT-3	what happened?		
00:18:00.6 HOT-1	oh my God. ahhh--		
00:18:02.4 HOT-2	it's been a long night.		
00:18:04.4 HOT-1	yeah that was not good.		
00:18:06.0 HOT-2	no.		
00:18:06.6 HOT-2	we'll have to. we'll tell you everything once we get to the gate and everything.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:18:09.7 HOT-3	okay.		
00:18:10.5 HOT-2	alright.		
00:18:10.9 HOT-3	alright.		
00:18:11.0 HOT-1	okay.		
00:18:12.0 HOT-3	[flight attendant asks about bags]		
00:18:15.9 HOT-2	okay.		
00:18:16.4 HOT-3	okay.		
00:18:16.5 HOT-1	okay.		
00:18:17.7 HOT-2	ahh. we had ice and [stammer] our ice systems never kicked on by the way.		
00:18:22.7 HOT-1	ahhh.		
00:18:22.7 HOT-2	look at this.		

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:18:23.6

HOT-2 we are covered in ice and we have nothing.

00:18:25.9

HOT-1 yep.

00:18:28.6

HOT-1 I just gotta' sit here for a second. oh my God.

00:18:32.4

HOT-2 my heart is.

00:18:33.9

HOT-1 I'm shakin'.

00:18:38.0

HOT-1 it looked like we had a hard-- a rudder hardover.

00:18:41.3

HOT-2 yeah.

00:18:42.0

HOT-1 and it was just (goin'). and then we.

00:18:43.9

HOT-2 and I had n-- I had no--

00:18:44.6

HOT-1 I slammed on the left rudder.

00:18:45.7

HOT-2 yeah.

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>
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00:18:46.6 HOT-1	so that knocked the systems out.
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00:18:50.2 HOT-1	because that's what it's supposed to do.
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00:18:51.5 HOT-2	yeah.
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00:18:51.9 HOT-1	and that's when we **--
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00:18:52.5 HOT-2	and that's when it righted itself.
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00:18:56.1 HOT-1	#.
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00:18:59.5 HOT-1	let's see where the hell I'm at.
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00:19:16.1 HOT-1	so we're at. Lima?
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00:19:20.6 HOT-1	that's right where. where it goes in alright.
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00:19:27.9 HOT-2	like I just had--.
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<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
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00:19:29.8 RDO-1	Tower Waterski thirty three ninety five we're ready to cross and go into the ramp.
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**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:19:43.5
HOT-1 [exhale]

00:19:48.9
HOT-2 alright.

00:19:51.2
HOT-1 [exhale]

00:19:55.8
HOT-1 at the time I was fine but now thinkin' back on how bad
that could have been. I'm # scared to death.

00:20:01.0
HOT-2 ah. yeah.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:19:33.8
TWR-B Waterski thirty three ninety five cross runway three six center taxi into
the ramp. and you do not need any assistance?

00:19:40.8
RDO-1 negative.

00:19:41.9
TWR-B roger.

00:19:45.8
RDO-1 and we'll cross three six center into the ramp Waterski thirty three
ninety five.

00:20:02.6
TWR-B Waterski thirty three ninety five switch to ground frequency one two
one point zero.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

00:20:13.0
HOT-2 it (just) looked awful. like I had no control.

00:20:26.0
HOT-2 ahhh.

00:20:26.7
HOT-1 Charlie Fourteen Alpha.

00:20:37.7
HOT-1 that maintenance guy is gonna' be busy.

00:20:46.2
HOT-2 arrr--

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

00:20:07.7
RDO-2 one two one point nothin' Waterski thirty three ninety five.

00:20:20.7
RDO-2 Ground Waterski thirty three ninety five is with you on Lima we are going to--

00:20:27.2
RDO-2 Charlie Fourteen.

00:20:39.9
RDO-2 Ground Waterski thirty three ninety five is with you on Lima we are going to Charlie Fourteen.

00:20:46.5
GND Waterski thirty three forty five roger. taxi to the gate. just making sure. I had ops come out just to take a look at ya. ah do you need any assistance or you're all set?

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:20:54.3 HOT-1	we're all set.		
		00:20:55.2 RDO-2	ah we're all set for now thanks Waterski thirty three ninety five.
00:20:55.3 HOT-1	I think--		
		00:20:57.4 GND	roger. let me know if you need anything. I do have ops if you wanted to check anything out or if you need something. just let me know.
		00:21:01.7 RDO-2	alright. will do. ah. once we get on the once we get to the gate we'll we'll assess the situation for Waterski thirty three ninety five.
00:21:07.7 HOT-2	we seriously had no ice. it did not kick on. and look how much ice is on this. on the windshield wiper.		
00:21:12.8 HOT-1	yep.		
00:21:17.8 HOT-1	this plane's a piece of # I guess. I don't know.		
00:21:26.8 HOT-1	sheez. I saw the ground and I was like. alright cool. we made it.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:21:32.4 HOT-2	well then. I'm like why is this why is autopilot the autopilot wouldn't kick off. remember it kept like screaming autopilot auto. I'm like why is this thing not kicking off.		
00:21:41.3 HOT-1	it was definitely.		
00:21:42.5 HOT-2	somethin'.		
00:21:43.4 HOT-1	(the) rudder hard over.		
00:21:46.0 HOT-1	cause why would it straighten out when I...jerked on that.		
00:21:56.3 HOT-1	got every light in the house on here.		
00:21:59.5 HOT-2	I mean I had the proper rudder correction in.		
00:22:04.5 HOT-1	ah it wasn't that. it was. it's the system messed up. it didn't have anything to do with you.		
00:22:22.9 HOT-1	# [whispering].		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:22:23.3 HOT	[sound of chime, similar to seat belt sign]		
00:22:25.2 HOT	[sound of multiple switches and decreased background sound, similar to engine spooling down]		
00:22:29.4 HOT	[sound of single chime, similar to master caution]		
00:22:32.1 HOT-2	alright.		
00:22:35.3 HOT	[crew begins shutdown checklist, recording lower, similar to crew not using headsets]		
00:30:09.3 HOT-1	***I'm thinking we had a rudder hardover to the right***		
00:30:37.5 HOT-1	***we got a lot of ice about two thousand feet***		
00:31:06.4 HOT-2	***you can see there's no SPS ICE SPEEDS on the EICAS***never kicked on***.		

<u>TIME and SOURCE</u>	<u>INTRA-AIRCRAFT CONTENT</u>	<u>TIME and SOURCE</u>	<u>AIR-GROUND COMMUNICATION CONTENT</u>
00:33:39.5 HOT-2	***we come in for the first approach. can't get a localizer. have to go missed. *** come back around. try and get it again. (it's not really holding). the the airplane's having a hard time. (so we descend on in). we're in ice. our icing stuff never worked. never came on. and then about fifty feet (before) the (ground) (or landing) (or less) our rudder. we had what's called a rudder hardover. where the rudder went one way and it took the whole plane with it. *** and the plane went from like this to I mean it *** (I don't know how much you felt ** (could) see back there). *** so he jammed on the other rudder to get the system to turn off *** and we were able to ** runway ** hard landing *** so ***.		
00:35:13.1 HOT-2	I'm afraid to go look at the plane. I really am.		
00:35:20.5 HOT-2	did the overhead bins pop open?		
00:35:23.4 HOT-4	***walk around did yeah?***		
00:35:37.2 HOT-4	*** shattered the glass. you got a hole in the tip of the wing. right above where ***.		
00:54:16.7 HOT-2	[mentions Director of Operations name]		
01:04:55.0 HOT-2	**everything's good on this side** alright.		

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

01:04:59.4
HOT [power cycle to CVR]

END OF TRANSCRIPT

01:04:59.4 CST

END OF RECORDING[§]

Additional 48 minutes 50 seconds after the end of the transcript.

[§] CST was not determined after the power cycle at the end of the transcribed period.