

Docket No. SA-531

Exhibit No. 12-A

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Cockpit Voice Recorder Group Chairman
Factual Report

(62 Pages)

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



GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

DCA09MA027

**By
Christopher Babcock**

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, DC 20594

March 31, 2009

Cockpit Voice Recorder - 12

Group Chairman's Factual Report By Christopher Babcock

A. EVENT

Location: Clarence Center, New York
Date: February 12, 2009, 2217 Eastern Standard Time (EST)¹
Aircraft: Dash 8-Q400, N200WQ
Operator: Colgan Air Inc. d.b.a. Continental Connection flight 3407
NTSB Number: DCA09MA027

B. GROUP A group was convened on February 15, 2009.

Chairman: Christopher Babcock
Aerospace Engineer
National Transportation Safety Board

Member: Bill Honan
Chief Pilot
Colgan Air

Member: Tony James
Air Safety Investigator
Federal Aviation Administration

Member: Chris Nelson
Captain
Air Line Pilots Association

Member: W.K. Warner
Chief Engineering Test Pilot
Bombardier de Havilland Inc

¹ All times are expressed in local EST, unless otherwise noted.

C. SUMMARY

On February 12, 2009, about 2217 EST, a Colgan Air Inc., Bombardier Dash 8-Q400, N200WQ, d.b.a. Continental Connection flight 3407, crashed during an instrument approach to runway 23 at the Buffalo-Niagara International Airport, Buffalo, New York. The four flight crew and 45 passengers were fatally injured and the aircraft was destroyed by impact forces and post crash fire. There was one ground fatality. Night visual meteorological conditions prevailed at the time of the accident. The flight was a Title 14 Code of Federal Regulations (CFR) Part 121 scheduled passenger flight from Liberty International Airport, Newark, New Jersey, to Buffalo.

A solid-state cockpit voice recorder (CVR) was recovered from the aircraft and sent to the National Transportation Safety Board's Audio Laboratory for readout. The CVR group meeting convened on February 15, 2009, and a full transcript was prepared for the final 58 minutes and 32 seconds of the 2-hour, 1-minute digital recording.

D. DETAILS OF INVESTIGATION

On February 13, 2009, the NTSB Vehicle Recorder Division's Audio Laboratory received the following CVR:

Recorder Manufacturer/Model:	Honeywell 6022 SSCVR 120
Recorder Serial Number:	97896

Recorder Description

Per Federal regulation, CVRs record a minimum of the last 30 minutes 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 30 minutes or 2 hours of CVR operation, depending on the CVR model. This model CVR, the Honeywell 6022 SSCVR 120, is a solid-state CVR that records 2 hours of digital cockpit audio. The recorded audio data is separated by the Honeywell download software into 2 sets of audio data files: a) a 2-channel recording containing the last 2 hours of recorded events and b) a 4-channel recording containing the last 30 minutes of recorded events. During the 2-hour portion of the recording, one channel contains audio information from the cockpit area microphone (CAM) and the other channel contains a mixture of two audio sources: the captain's audio panel information and the first officer's audio panel information. 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 available for interphone, public address, or flight deck jumpseat audio information.

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 2-hour portion of the CVR recording contained excellent quality² audio data on the both the mixed crew channel and CAM channel. Table 1 indicates the contents and quality of each channel on the 30-minute segment of the recording.

Table 1. Audio contents and quality of 30-minute recording.

Channel	Content/Source	Quality
1	PA	Excellent
2	First Officer	Excellent
3	Captain	Excellent
4	CAM	Excellent

Timing and Correlation

Timing on the transcript was established by correlating the last fifteen radio transmissions from the aircraft with the corresponding events on the FDR. Each of the fifteen radio transmissions acted as an anchor point for a linear interpolation between the remaining CVR events. A linear function of the form

$$FDR = m * CVR + b, \quad (1)$$

was fit to the data where m is the slope of the interpolation and b is the offset. Using the values in Table 2 the correlation between CVR elapsed time and FDR subframe reference number is:

$$FDR = 1.0 * CVR + 88303.4 \quad (2)$$

Table 2. Begin and end times of events used to correlate CVR and FDR.

FDR Start	FDR Stop	CVR Start	CVR Stop
95526.94	95527.94	7223.1	7225.3
95477.94	95481.94	7173.8	7178.7
95407.94	95408.94	7103.6	7106.1
95322.94	95323.94	7018.6	7021.1
95296.94	95298.94	6993.3	6995.8
95110.94	95111.94	6807.2	6809.2
95080.94	95080.94	6776.5	6778.5
95029.94	95032.94	6725.7	6730.2
95008.94	95012.94	6704.9	6710.2
94997.94	94999.94	6693.6	6696.6
94859.94	94860.94	6555.6	6558.2
94838.94	94839.94	6534.8	6536.8
94800.94	94802.94	6496.7	6499.8
94788.94	94792.94	6484.6	6489.5
94777.94	94779.94	6474.3	6476.7

² See attached CVR Quality Rating Scale.

In order to arrive at local EST a correlation was performed between FDR subframe reference number and UTC time as determined by FAA ASRS radar by comparing FDR recorded pressure altitude and pressure altitude as determined by radar. From the Aircraft Performance Group Chairman's Factual Report this correlation is:

$$UTC = FDR - 83755.1 \quad (3)$$

Combining Equations 2 and 3 and subtracting five hours from UTC time, all CVR events are expressed in local EST.

$$UTC = CVR + 4548.3 \quad (4)$$

Description of Audio Events

The recording began at 2015:48 and the transcript begins with the takeoff roll at Newark at 2118:22. The transcript contains events from the aircraft's takeoff, climb, cruise, descent, and approach and accident sequence. The recording ends at 2216:54.

Christopher Babcock
Aerospace Engineer
Vehicle Recorder Division

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 a Honeywell 6022 SSCVR 120 solid-state cockpit voice recorder, serial number 97896, installed on a Colgan Air Dash 8-Q400 (N200WQ), which crashed during an instrument approach to the Buffalo-Niagara International Airport, Buffalo, NY.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
INT	Interphone voice or sound source
RDO	Radio transmissions from N200WQ
TWR	Radio transmission from the Newark Tower controller
DEP	Radio transmission from New York Departure controller
ZNY	Radio transmission from the New York Center controller
ZOB	Radio transmission from the Cleveland Center controller
APP	Radio transmission from the Buffalo Approach controller
OPS	Radio transmission from the Colgan Buffalo Operations ground controller
-A	First controller at identified ATC facility
-B	Second controller at identified ATC facility
-C	Third controller at identified ATC facility
-1	Voice identified as the captain
-2	Voice identified as the first officer
-3	Voice identified as the flight attendant
-?	Voice unidentified
*	Unintelligible word
#	Expletive
@	Non-pertinent word
()	Questionable insertion
[]	Editorial insertion

Note 1: Times are expressed in Eastern Standard Time.

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.

INTRA-AIRCRAFT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
20:15:48 START OF RECORDING	
21:18:22 START OF TRANSCRIPT	
21:18:30.3 HOT-1	alright cleared for takeoff it's mine up to two thousand heading two seven zero after departure. here we go.
21:18:35.4 CAM	[sound of increasing engine rpm]
21:18:42.3 HOT-1	check power.
21:18:44.6 HOT-2	and power checked.
21:18:48.8 HOT-2	eighty knots.
21:18:50.1 HOT-1	eighty.
21:18:55.0 HOT-2	V one.
21:18:56.2 HOT-2	rotate.
21:19:01.6 HOT-2	positive rate.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
21:18:22.8 TWR	and Colgan thirty four oh seven runway two two right at whiskey winds three zero zero at one niner cleared for takeoff.
21:18:27.7 RDO-2	cleared for takeoff Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:19:02.3
HOT-1 gear up.

21:19:03.0
CAM [sound similar to landing gear handle movement]

21:19:07.5
CAM [sound similar nose gear uplock and door closing]

21:19:31.6
HOT [sound similar to altitude alert]

21:19:35.5
HOT-2 ten thousand.

21:19:36.4
HOT-1 ten thousand alt sel flaps zero. set indicated airspeed two ten. climb checklist.

21:19:44.3
HOT-2 alrighty.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

21:19:10.4
TWR Colgan thirty four oh seven turn right heading two seven zero maintain two thousand contact New York Departure.

21:19:15.0
RDO-2 right two seventy two thousand and over to departure Colgan thirty four zero seven.

21:19:20.7
RDO-2 Departure Colgan thirty four oh seven is seven hundred for two thousand heading two seventy.

21:19:26.5
DEP-A Colgan uh thirty four oh seven New York radar contact. climb maintain one zero ten thousand.

21:19:32.5
RDO-2 up to ten thousand Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
21:19:45.4 CAM	[sound similar to decreasing propeller rpm]
21:20:13.9 HOT-2	direct COATE.
21:20:14.2 HOT-1	direct COATE.
21:20:19.5 HOT-1	and NAV for me.
21:20:20.2 HOT-2	NAV selected.
21:20:39.9 HOT-1	wee this is fun.
21:20:41.7 HOT-2	yeah.
21:20:43.0 HOT-1	okay almost.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
21:20:08.9 DEP-A	Colgan thirty four oh seven proceed direct COATE.
21:20:11.5 RDO-2	direct COATE Colgan thirty four zero seven.
21:20:46.6 DEP-A	Colgan thirty four oh seven contact departure one one eight one seven. eighteen seventeen.
21:20:50.9 RDO-2	eighteen seventeen Colgan thirty two— thirty four zero seven.
21:21:00.9 RDO-2	[sound of mic click]

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:22:27.0

HOT-2 and climb checklist complete. I don't know if I said it or not.

21:22:31.0

PA-3 ladies and gentlemen for your continued safety we do ask that you keep your seatbelts securely fastened even if the captain turns off the fasten seatbelt sign. we would like to add a special welcome to our One Pass members. you'll be earning valuable miles for your trip today. if you are not already a member of the One Pass program you can enroll online at Continental dot com...Continental Connection is pleased to provide you with a complimentary copy of Sky Mall catalogue and Continental Magazine both located in your seat pocket.

21:22:31.6

HOT-1 autopilot's engaged.

21:22:33.5

HOT-2 alright.

21:22:39.2

HOT-1 it's probably a good thing.

21:22:43.7

HOT [sound similar to altitude alert]

21:22:44.9

HOT-1 nine ten alt sel.

21:22:45.7

HOT-2 ten alt sel.

21:23:08.7

HOT [sound of double chime]

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

21:21:10.0

RDO-2 departure Colgan thirty four zero seven five point seven for ten thousand.

21:21:14.2

DEP-B Colgan thirty four zero seven New York Departure roger.

INTRA-AIRCRAFT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
21:23:14.1 PA-2	we're through ten thousand feet.
21:23:24.3 PA-3	ladies and gentlemen the use of approved portable electronic devices is now permitted.
21:24:04.6 HOT-1	twelve alt sel.
21:24:05.4 HOT-2	twelve alt sel.
21:24:47.2 HOT-1	eleven twelve alt sel.
21:24:47.3 HOT	[sound similar to altitude alert]
21:24:48.6 HOT-2	eleven twelve alt sel.
21:25:14.2 HOT-1	have you ever looked at the logbook very much as far as uh like putting your times and stuff in?
21:25:19.8 HOT-2	um-hum.
21:25:20.7 HOT-1	* okay. I kinda * you just haven't done like writeups?
21:25:25.2 HOT-2	yeah I just haven't written anything in it but I've looked at it and looked up crew writeups.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
21:23:56.6 DEP-B	Colgan thirty four zero seven climb maintain one two twelve thousand. proceed direct COATE.
21:24:01.4 RDO-2	twelve thousand direct COATE Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

**TIME and
SOURCE**

CONTENT

21:26:18.0

HOT-1 well I didn't write any numbers down so.

21:26:21.8

HOT [sound of double chime]

21:26:23.6

HOT-1 uh.

21:26:24.8

INT-2 hello.

21:26:25.6

INT-3 hi what do you think about doing service?

21:26:29.0

INT-1 actually I think if you could uh do something fairly quick I think we might be okay. I don't have a whole lotta cloud cover up here.

21:26:36.4

INT-3 okay.

21:26:37.1

INT-1 uh just be careful.

21:26:38.8

INT-3 okay.

21:26:39.1

INT-1 if we hear of anything—.

21:26:40.7

INT-3 give us a buzz.

21:26:41.2

INT-1 we will.

21:26:41.9

INT-3 alright thanks.

AIR-GROUND COMMUNICATION

**TIME and
SOURCE**

CONTENT

INTRA-AIRCRAFT COMMUNICATION

**TIME and
SOURCE**

CONTENT

21:27:29.3
HOT-1 geez.

21:27:30.7
HOT-1 this I **.

21:28:25.1
HOT-2 six seven.

21:28:25.6
HOT-1 sixty seven set crosscheck.

AIR-GROUND COMMUNICATION

**TIME and
SOURCE**

CONTENT

21:27:08.1
DEP-B Colgan thirty four zero seven contact New York Center one tree two point six good day.

21:27:12.6
RDO-2 one three two point six Colgan thirty four zero seven.

21:27:22.4
RDO-2 departure Colgan thirty four zero seven twelve thousand direct COATE.

21:27:31.5
ZNY-A Colgan thirty four zero seven New York Center you should be with the New York Center on one three two point six.

21:27:40.8
RDO-2 alrighty we'll try them thirty four zero seven thanks.

21:28:12.9
RDO-2 Center Colgan thirty four zero seven twelve thousand direct COATE.

21:28:16.8
ZNY-B Colgan thirty four zero seven New York Center roger. Wilkes-Barre altimeter two nine six seven.

21:28:22.3
RDO-2 six seven thanks.

INTRA-AIRCRAFT COMMUNICATION

**TIME and
SOURCE**

CONTENT

21:28:27.4
HOT-2 set crosschecked.

21:28:30.1
HOT-1 alright.

21:28:42.0
HOT-1 today's the twelfth right?

21:28:43.5
HOT-2 yup.

21:28:47.0
HOT-2 at least that's what you told me earlier.

21:28:50.2
HOT-1 well that's my story and I'm sticking to it.

21:28:52.2
HOT-2 alright.

21:28:58.5
HOT-1 well that's good.

21:29:19.7
HOT-1 so where's this page here? I don't see any writing on it.

21:29:32.6
HOT-1 interesting.

21:29:50.1
HOT-1 alright I'll give that to you.

21:29:52.8
HOT-2 alright.

21:29:53.7
HOT-1 fill out what you can...I'll sign it **.

21:30:31.1
HOT-2 it's Zulu time is the in and out right?

AIR-GROUND COMMUNICATION

**TIME and
SOURCE**

CONTENT

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:30:34.3
HOT-1 uh that's in Zulu time but we want it local time.

21:30:36.3
HOT-2 yeah local okay.

21:30:38.5
HOT-1 on here. so just minus five. sooooo let's see.

21:30:45.4
HOT-2 so nineteen forty five.

21:30:47.5
HOT-1 seven forty five yeah nineteen forty five...wow an hour and a half taxi.

21:30:53.7
HOT-2 yeah. **.

21:30:57.8
HOT-1 oh that just— that just stinks...we can't reap the benefit.

21:31:04.3
HOT-2 I know.

21:31:53.0
HOT-2 sixteen.

21:31:53.5
HOT-1 sixteen alt sel.

21:31:54.9
HOT-2 alt sel.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

21:31:18.1
RDO-1 blocked.

21:31:44.6
ZNY-B Colgan thirty four zero seven climb to flight level— correction climb to one six thousand.

21:31:50.0
RDO-2 one six thousand Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

**TIME and
SOURCE**

CONTENT

21:32:08.4

HOT-1 oops. you didn't feel that.

21:32:11.0

HOT-2 no I didn't feel that.

21:32:13.0

HOT-2 they didn't do a twenty four hour ice protection test.

21:32:15.4

HOT-1 yeah I just did.

21:32:16.5

HOT-2 you did?

21:32:17.2

HOT-1 yup.

21:32:20.5

HOT-1 that's why I was looking back on all those pages.

21:32:22.8

HOT-2 yeah.

21:32:23.2

HOT-1 it said it was miss— er uh you know.

21:32:27.3

HOT-2 yeah.

21:32:28.0

HOT-1 there uh there was one page there wasn't anything on it. so it's like they they tore it out in error.

21:32:34.1

HOT-2 oh yeah.

21:32:35.4

HOT-1 so.

21:32:58.1

HOT-2 just twenty four ice test complete? or write—.

AIR-GROUND COMMUNICATION

**TIME and
SOURCE**

CONTENT

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:33:02.0
HOT-1 yeah I'd— I'd put twenty four hour uh check's complete.

21:33:19.1
HOT-2 alrighty.

21:33:31.8
HOT-1 there we go.

21:33:48.0
HOT-2 I'm assuming we're only gonna land once.

21:33:51.6
HOT-1 yeah.

21:33:56.8
HOT-1 the only thing that um I would not do— well the type of flight— I don't know if you can see it here. I'll show you.

21:34:03.8
HOT-2 I see. oh yeah I didn't know what to—.

21:34:05.9
HOT-1 if if you don't know the type of flight it is it's— it's down here on the bottom.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

21:33:20.9
ZNY-B Colgan thirty four zero seven contact New York Center one tree tree point tree five.

21:33:25.8
RDO-2 one three three point three five Colgan thirty four zero seven.

21:33:32.9
RDO-2 thirty four zero seven fourteen point one for sixteen thousand.

21:33:37.3
ZNY-C Colgan thirty four zero seven New York Center roger. Wilkes-Barre altimeter two niner six seven.

21:33:42.4
RDO-2 six seven thank you thirty four oh seven.

INTRA-AIRCRAFT COMMUNICATION

**TIME and
SOURCE**

CONTENT

21:34:08.1
HOT-2 uh-huh. oh oh okay.

21:34:10.2
HOT-1 just a regular revenue flight—.

21:34:11.4
HOT [sound similar to altitude alert]

21:34:12.3
HOT-1 fifteen sixteen alt sel. regular revenue flight is type one.

21:34:15.2
HOT-2 okay.

21:34:17.3
HOT-1 unless it's a reposition or special ferry or whatever it's something else.

21:34:21.0
HOT-2 [sound similar to sneeze]

21:34:21.6
HOT-1 bless you.

21:34:22.2
HOT-2 excuse me. okay.

21:34:24.0
HOT-1 um a— and this is just my little deal and it is what I was taught and everything. and and it makes sense to me.

21:34:31.9
HOT-2 sure.

21:34:32.7
HOT-1 um on your two.

21:34:35.6
HOT-2 uh-huh.

21:34:36.3
HOT-1 what happens if we have to divert to an alternate?

AIR-GROUND COMMUNICATION

**TIME and
SOURCE**

CONTENT

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

**TIME and
SOURCE**

CONTENT

**TIME and
SOURCE**

CONTENT

21:34:39.0

HOT-2 oh yeah that's true.

21:34:40.0

HOT-1 um I was told it was their little uh uh like superstition.

21:34:46.3

HOT-2 oh.

21:34:46.6

HOT-1 you don't put— you don't put it until you land there.

21:34:49.3

HOT-2 right right. no that makes sense.

21:34:49.7

HOT-1 uh but well okay. well you can take it that far. I don't care. but it makes sense that if you have to divert someplace at least you're not scratching through and doing all that kind of stuff. uh but I still do the one landing and however many starts we have and fill the rest of it out.

21:34:59.3

HOT-2 yeah.

21:35:06.5

HOT-2 yeah.

21:35:07.9

HOT-1 but uh other than that that's all there is to it. on your writeups—.

21:35:15.0

HOT-2 I've written— I mean I've written other planes up before. just not from— with Colgan.

21:35:18.1

HOT-1 okay alright so you know like the one P or the two P as you write em up like that?

21:35:20.6

HOT-2 uh-huh. yeah.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

**TIME and
SOURCE**

CONTENT

**TIME and
SOURCE**

CONTENT

21:35:23.7

HOT-1 write it up. uh and if you're doing one twenty one ops you obviously know as short sweet to the point as you possibly can um.

21:35:36.0

HOT-2 give em all the details that you need to give.

21:35:38.2

HOT-1 yeah but but also don't get too wordy with it.

21:35:42.4

HOT-2 right.

21:35:44.0

HOT-1 um and what I try to do is— is I'd look up in the MEL book.

21:35:54.7

HOT-2 uh-huh.

21:35:55.3

HOT-1 to begin with before I write things up.

21:35:58.0

HOT-2 so you know yeah.

21:35:59.0

HOT-1 that way if I screw up and write it up one way and it grounds the airplane but it's not— it's not exactly or I could write it up slightly different to get an MEL to get it back to where you can do maintenance type of deal.

21:36:15.1

HOT-2 yeah.

21:36:16.3

HOT-1 it's it's a judgment call by all means.

21:36:19.7

HOT-2 yeah.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

TIME and SOURCE

CONTENT

21:36:21.2

HOT-1 you you definitely want to write the proper thing up. um you know I try to uh uh get em to fix— I uh on the Saab we don't have glass we uh we had EFIS screens.

21:36:37.7

HOT-2 right.

21:36:40.1

HOT-1 but uh you had a EHSI and uh a EADI.

21:36:45.5

HOT-2 uh-huh.

21:36:46.2

HOT-1 I wrote up the course selector. course one selector.

21:36:49.0

HOT-2 uh-huh.

21:36:50.7

HOT-1 uh because it wouldn't move. it was stuck on one particular course setting.

21:36:55.9

HOT-2 uh-huh.

21:36:56.7

HOT-1 and uh wrote it up totally explained exactly what it was and they uh at the time there were four planes down. two getting line checks and then my airplane and another one uh that had something wrong with it. they only had four mechanics on duty at the time. so they were all trying to do something. er I'm sorry they had four down I was the fifth one.

21:37:20.1

HOT-2 oh okay.

21:37:21.1

HOT-1 so they tried to MEL the uh the uh the autopilot system uh because of the heading selector.

21:37:32.0

HOT-2 yeah.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

**TIME and
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21:37:32.6

HOT-1 I you know I wouldn't be able to turn. and it's like wait a minute. it doesn't even apply.

21:37:36.4

HOT-2 yeah.

21:37:37.4

HOT-1 so uh you got to be careful about that.

21:37:40.5

HOT-2 yeah.

21:37:41.2

HOT-1 just don't— you know understand the MELs that they uh they try to put on it make sure it applies to what you're doing.

21:37:48.3

HOT-2 yeah.

21:37:48.7

HOT-1 and the problem you're having. and I I called em back and told em uh that it doesn't have anything to do with the autopilot. well I mean doesn't it do this this this? no it's— this is what's wrong or this is what I told them before. ohhhhhh.

21:38:03.6

HOT-2 yeah.

21:38:04.6

HOT-1 eh well can we just go ahead with that MELed we'll uh get it—. well I'll tell you we could go with that MEL but I can't sign the release. I guess we'll have to get somebody to fix it then won't we. well I guess we will.

21:38:18.9

HOT-2 [sound of laughter]

21:38:19.5

HOT-1 took em twenty minutes to fix it. they just had to pop out a panel uh little component put in another component.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

**TIME and
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21:38:25.2

HOT-2 yeah.

21:38:26.1

HOT-1 and it took em all of twenty minutes. it's just the fact that they were short-handed.

21:38:29.2

HOT-2 oh yeah.

21:38:29.7

HOT-1 they were trying to uh uh—.

21:38:31.9

HOT-2 save a minute here.

21:38:32.7

HOT-1 yeah save a minute here. get us out back and then they would have time to do it.

21:38:36.8

HOT-2 yeah.

21:38:41.1

HOT-1 but of course that turned into a fiasco. we were going to Alexandria Louisiana that night.

21:38:46.3

HOT-2 oh yeah.

21:38:46.7

HOT-1 and uh let's do a cruise checklist.

21:38:49.8

HOT-2 oh cruise checklist.

21:38:51.2

HOT-1 yeah.

21:38:52.4

HOT-2 altimeters two niner six seven set crosscheck.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:38:54.9

HOT-1 two niner six seven set crosscheck.

21:38:57.5

HOT-2 power set seatbelt sign on lights set cabin pressure check. and well cabin pressure. what's Buffalo at?

21:39:07.0

HOT-1 uh not too much. uh seven twenty eight.

21:39:08.7

HOT-2 seven hundred.

21:39:12.7

HOT-2 cabin pressure check and twenty four hour ice protection test complete. cruise checklist complete. um-huh.

21:39:17.2

HOT-1 thanks. yeah we uh after they fixed it so— we were already delayed. they fixed it we were delayed a little bit more. no big deal.

21:39:24.0

HOT-2 yeah.

21:39:24.2

HOT-1 get in uh start up number two and we're doing the paperwork and all of a sudden we get bing. look— it looked— it was engine lookup light. I went oh crap that's not good. I looked up it was chip detect. right chip detect.

21:39:43.3

HOT-2 what's that?

21:39:43.7

HOT-1 what— what that— what that's doing is detecting chips of metal in the engine.

21:39:48.4

HOT-2 oh.

AIR-GROUND COMMUNICATION

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INTRA-AIRCRAFT COMMUNICATION

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21:39:50.2

HOT-1 and uh we were thinking aww crap. so I said grab the checklist real quick and let's just go through it. well in the chip detect abnormal checklist there's nothing pertaining to on the ground. it's all pertaining to in the air so I said okay shut it down. called maintenance they came over they cleaned out a little filter screen. they said it was probably carbon built up blah blah blah.

21:40:16.8

HOT-2 yeah.

21:40:17.4

HOT-1 they fel— uh cleaned out this little carbon screen. did uh a runup check observation. I kept everybody on the plane. told em what was going on. man their eyes were you know they're all over here watching what they were doing. but it was either that or they'd have to get bussed around get out and bout the time that they'd get out they would bus em back around.

21:40:36.7

HOT-2 yeah.

21:40:37.2

HOT-1 anyway we started up ops check good. so filling out filling out the paperwork. got the door closed and everything. it's got a little whiskey hatch over here.

21:40:45.4

HOT-2 uh-huh.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

21:40:05.3

ZNY-C two eight charlie golf climb and maintain flight level two two zero.

21:40:09.8

N28CG two zero zero for two two zero two eight charlie golf.

21:40:12.1

ZNY-C and how would you describe the icing?

21:40:18.3

N28CG yeah we'll call it about light to moderate rime.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:40:46.0

HOT-1 I'm handing the paperwork out. ding. #. right chip detect— chip detect again.

21:40:51.8

HOT-2 ohh.

21:40:52.8

HOT-1 so I shut it down told everybody yeah we're gonna have to get another airplane. they had another airplane it was on a Saturday so they had extra— they had spares because of the schedule and everything.

21:41:01.9

HOT-2 yeah.

21:41:04.4

HOT-1 um so uh twenty minutes later we launch and get about halfway up there uh over this one VOR and uh all of a sudden oh and uh uh I'll back up a half a step. I was telling the—telling the FO this was like— I don't know a month after I upgraded to captain.

21:41:29.7

HOT-2 oh geez.

21:41:30.6

HOT-1 I said you know uh uh all this stuff is just happening to me. and it's— you know hell the only thing I haven't had is an air return.

21:41:39.8

HOT-2 oh God.

21:41:40.8

HOT-1 so we get over this VOR headed to Alexandria. ding ding ding. that's not a caution light that's a master warning.

21:41:48.5

HOT-2 yeah.

21:41:50.5

HOT-1 and uh looked up avionics smoke detector.

AIR-GROUND COMMUNICATION

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CONTENT

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

**TIME and
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**TIME and
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21:41:56.2

HOT-2 ohh.

21:41:58.2

HOT-1 I'm going @ my FO cool as #. man should I get my uh smoke goggles on and everything. said yeah gimme— gimme the memory items. I'm— I'm over here. I don't smell anything. the avionics bay is right behind the captain's seat.

21:42:15.9

HOT-2 yeah.

21:42:17.1

HOT-1 there's a little uh fire bottle. little uh rubber kind of cover thing that you can stick the fire bottle into and blow it if you need to if you're actually on fire.

21:42:21.1

HOT-2 uh-huh...uh-huh.

21:42:28.2

HOT-1 I reach back in here and find it and uh I open it up because it's— it's kind of like a drainer in a sink.

21:42:35.5

HOT-2 yeah.

21:42:35.9

HOT-1 like over a garbage disposal. it's just kinda like this. and it's rubber and you can push.

21:42:40.2

HOT-2 uh-huh.

21:42:40.5

HOT-1 so I pushed it. man man I don't smell anything. called the flight attendant. @ hey do you smell any smoke back there? no. why? should I?

21:42:53.3

HOT-2 [sound of laughter]

INTRA-AIRCRAFT COMMUNICATION

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21:42:55.5

HOT-1 well no you shouldn't. I'm glad you don't. thanks for playing the game.
and— and I just cut her off. good *. [sound of laughter]

21:43:04.3

HOT-2 nice.

21:43:05.9

HOT-1 she calls back well uh what— what do you want me to do? I said naw
man uh I said I think it's just a false alarm. but uh I was just checking. we
just— we've got a light up here that went off. I said I don't think there's
anything to it. so anyway she— she was good with that. and uh we didn't
have ACARS— we don't have ACARS in the Saabs. so I called uh
Manassas on ARINC. I said uh so uh what do you want me to do? go
back to Houston? continue on or what? call us when you get on the
ground in Alexandria. hey no problem. so they're gonna do a road trip and
change the smoke detector out.

21:43:23.7

HOT-2 yeah...yeah.

21:43:48.5

HOT-1 and uh sure enough by the next morning— we were taking it out the next
morning they had— they had come— they did a road trip from Houston.
changed the deal out. away we went. of course after that day uh we all
went to the uh steakhouse. we ate a steak baked potato and drank a
messload of beer.

21:44:09.4

HOT-2 yeah.

21:44:10.2

HOT-1 it was just one of those— one of those days. yeah.

21:44:12.1

HOT-2 one of those days where you have to have a few beers at the end.

21:44:16.4

HOT-1 that was that was a good time. I like flying the Saab. if— if you upgrade to
the Saab— I mean if you have the opportunity to upgrade to Saab versus
the Q and you want to get your PIC time.

AIR-GROUND COMMUNICATION

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INTRA-AIRCRAFT COMMUNICATION

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21:44:29.2

HOT-2 um-huh.

21:44:29.5

HOT-1 and uh you know and if that's uh you know a goal for you I guess go ahead and do it.

21:44:34.0

HOT-2 yeah. um-huh.

21:44:35.8

HOT-1 that a neat airplane to fly. it's not like this.

21:44:38.2

HOT-2 yeah right.

21:44:40.1

HOT-1 I mean it's taking five steps backwards but you're in the left seat.

21:44:46.2

HOT-2 yeah.

21:44:46.5

HOT-1 it's— it's like moms SUV or minivan. you know the soccer van uh you don't have to fly with your hands and your feet. you just fly with your hands.

21:44:59.2

HOT-2 yeah.

21:44:59.5

HOT-1 once you— once you flip the auto— uh the yaw damp on and autopilot on it's solid as a rock.

21:45:05.2

HOT-2 works the rudders for you.

21:45:07.1

HOT-1 yeah it works rudders for you. it's all coordinated.

AIR-GROUND COMMUNICATION

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INTRA-AIRCRAFT COMMUNICATION

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21:45:09.9

HOT-2 I think it's fun flying with— with captains. not so much any— lately but right at first that came from the Saab and they'd see— they'd see the rudder and they'd— aww # and kick it really hard and fling the plane back and forth.

21:45:23.8

HOT-1 kind of like I did a little while ago.

21:45:25.4

HOT-2 yeah kind of but uh at first I flew— I flew with some captains that were doing it really bad.

21:45:30.5

HOT-1 really.

21:45:30.9

HOT-2 like knock the flight attendants down in the back.

21:45:32.7

HOT-1 [sound of laughter]

21:45:34.5

HOT-2 like I'd see the flight attendants afterwards and they're like um who was flying.

21:45:39.8

HOT-1 that would be that bonehead captain.

21:45:42.8

HOT-2 [sound of laughter]

21:45:44.0

HOT-1 you know what? yeah I tell you I'm getting a lot more used to it. uh I'm not saying I like it any better but I am getting used to it.

21:45:51.0

HOT-2 yeah.

INTRA-AIRCRAFT COMMUNICATION

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21:45:55.6

HOT-2 yeah I don't know what I want to do with the upgrade. I'm not entirely in like a big rush to upgrade. um it would depend on where I'm based. just because having to commute to be the bottom of the list is gonna suck. and—.

21:46:07.0

HOT-1 true and— and you know like you were talking about as far as uh right now your wanting to buy a house and wanting to have—.

21:46:13.6

HOT-2 exactly if I hold off— you know if it's a matter of holding on a few months well then I'll be making a substantial amount more money in the— in the Q than I would in the Saab.

21:46:22.0

HOT-1 right.

21:46:22.9

HOT-2 depending you know how— how long would it be to make that worth my while. would it— would I make more money upgrading into the Saab right away or would I make more money if I waited for the Q for a little while.

21:46:32.6

HOT-1 well think of it this way uh if you— if you stayed on the on the Q obviously you're gonna— you're not making the captain rate.

21:46:42.0

HOT-2 right.

21:46:42.5

HOT-1 but you may have a better quality of life to begin with uhh with regards to buying a house and having a schedule to where you you know you could work around and you could be—.

21:46:55.3

HOT-2 exactly.

21:46:55.6

HOT-1 you know home with your husband to to take care of all that kind of stuff.

AIR-GROUND COMMUNICATION

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INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

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21:46:59.6

HOT-2 exactly yeah it's just gonna depend where we're at when that happens. but I— I mean I'm not— I'm not in such a hurry to upgrade. I've got very very good connections at Alaska.

21:47:10.4

HOT-2 oh cool.

21:47:11.2

HOT-2 Alaska's the only major I'd want to go to.

21:47:13.2

HOT-1 yeah.

21:47:13.5

HOT-2 just because I don't want to commute my whole life...so um once I do upgrade you know once Alaska starts hiring I don't— I mean I don't necessarily have to have a thousand hours PIC. I need to have some PIC.

21:47:25.7

HOT-1 you don't have to with uh Alaska?

21:47:26.8

HOT-2 um it it depends. you you do and on paper you do but it just— it it depends who you know. if you know people then you can kind of sneak away with it a little bit. I definitely need to have you know the proper experience you need to be qualified. but if I have—.

21:47:36.6

HOT-1 huh...sure.

21:47:40.4

HOT-2 you know if at about five hundred hours they said to to go and interview and then I can interview and they can say we want you to have a thousand hours. so once you get a thousand hours um we're gonna put you into ground school. they'll say stuff like that.

21:47:53.9

HOT-1 okay.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

**TIME and
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21:47:54.3

HOT-2 so I mean it depends and I don't even know if that's the route I want to go anymore...you know the more I think about it. I wouldn't I wouldn't mind flying for FedEx or UPS.

21:48:09.3

HOT-1 FedEx is still big on military time and the uh and the internal recommendations so those two things— I mean that knocks me out of FedEx for sure.

21:48:10.5

HOT-2 yeah...yeah.

21:48:18.0

HOT-1 but uh UPS like I said I got my cousin that uh flies seven fives seven six. he's based in Ontario.

21:48:26.3

HOT-2 yeah.

21:48:27.2

HOT-1 uh not too far from where he lives. but uh.

21:48:36.3

HOT-2 yeah I wouldn't mind— you know I could even see myself doing like I mean for quality of life I could see myself doing cargo stuff and just I mean like small stuff like there's a company that flies right out of my hometown to Spokane Washington and back every night.

21:48:36.7

HOT-1 that's just—.

21:48:49.5

HOT [tones similar to ACARS message reception]

21:48:51.2

HOT-2 and I'd do that three nights a week and be home. I could have kids and raise a family. and I think that that might be more worth my while. something like that.

21:48:58.5

HOT-1 yeah yeah.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

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21:48:59.6

HOT-2 and it just depends. I don't even know. I'm I'm so in limbo right now it's actually kind of kind of interesting. like I don't know where I'll be in a year. I don't know where I'll be in—.

21:49:05.4

HOT-1 well just keep your eyes open you know and and keep you know keep listening uhh and and something will come across er you know you'll know whenever it's time.

21:49:18.2

HOT-2 yeah.

21:49:18.3

HOT-1 I've gotta do this. I've gotta— I'm ready to move on. um [sound similar to yawn] excuse me. it's kind of like me. you know I started this this little gig late in life.

21:49:28.7

HOT-2 yeah.

21:49:28.9

HOT-1 oh it's like it's a second career for me basically because I— I was able to take that package with Verizon.

21:49:34.1

HOT-2 yeah.

21:49:35.5

HOT-1 but uh...you know it's...you know do I— g— at this point do I go to a major and you know not be able to be there for very long.

21:49:48.8

HOT-2 yeah be an FO the rest of your life or...

21:49:51.8

HOT-1 uhh which— that may not be a bad thing as long as I would be able to progress and and uh and be a lifetime FO if you will.

21:50:02.9

HOT-2 yeah yeah.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

TIME and SOURCE

CONTENT

21:50:03.4
HOT-1 uh and just and and dwell upon the quality of life part of it or do I stay here with Colgan and uh...

21:50:11.8
HOT-2 [sound similar to sneeze] excuse me.

21:50:15.2
HOT-1 and you know likewise do the quality of life. I don't have to make two hundred thousand dollars a year er a hundred fifty thousand dollars a year whatever you know I could—.

21:50:20.7
HOT-2 exactly.

21:50:23.8
HOT-1 I can certainly be comfortable on on a hundred thousand. um you got traffic out there just it's crossing left to right.

21:50:32.9
HOT-2 uh in sight.

21:50:35.4
HOT-1 but uh—.

21:50:41.8
HOT-2 um winds are at two fifty at fifteen gusting twenty three they're using runway—.

21:50:45.0
ZNY-C Colgan three four zero seven contact Cleveland Center one two four point three two.

21:50:48.8
RDO-2 one two four point three two Colgan three four zero seven.

21:50:53.1
HOT-2 one two four thirty two.

21:50:58.5
RDO-2 Cleveland Center Colgan thirty four zero seven sixteen thousand.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:51:05.4
HOT-2 alright so it's the winds are at two five zero fifteen gusting twenty three and they're using three two and two three. do you want to use uh—.

21:51:11.7
HOT-1 uh two three.

21:51:12.5
HOT-2 two three.

21:51:13.2
HOT-1 yeah.

21:51:13.7
HOT-2 okay.

21:51:16.3
HOT-1 and flaps fifteen.

21:51:18.3
HOT-2 okay.

21:51:21.7
HOT-2 uh it's runway two three.

21:51:23.8
HOT-1 ouch.

21:51:35.8
HOT-2 that us?

21:51:37.0
HOT-1 nope.

21:51:37.4
HOT-2 I didn't think so.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

21:51:02.1
ZOB Colgan thirty four zero seven Cleveland Center roger.

21:51:26.1
ZOB Southwest six fifteen cleared direct to the Buffalo airport.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

**TIME and
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21:51:38.6

HOT-1 yeah.

21:51:39.1

HOT-2 [sound of laughter] I just heard direct Buffalo.

21:51:42.0

HOT-2 uh does this look good to you? um...we've got TRAVA ILS two three TRAVA KLUMP runway two three.

21:51:50.7

HOT-1 yeah TRAVA.

21:51:51.9

HOT-2 yeah here you go. and the EOA is in there.

21:51:59.4

HOT-1 thirty three.

21:52:05.1

HOT-1 try not to be dyslexic.

21:52:07.8

HOT-2 [sound of laughter]

21:52:08.2

HOT-1 last time I flew in here two thirty uh— two thirty three's the uh inbound course. I put two twenty three.

21:52:14.2

HOT-2 oh geez. two thirty thirty three— no * it's runway— oh it is two thirty three?

21:52:19.6

HOT-1 it's two thirty three.

21:52:21.3

HOT-2 runway two three. oh yeah no that makes sense. now you got me confused.

21:52:26.2

HOT-1 well I— well I didn't mean to confuse you now. two three three.

INTRA-AIRCRAFT COMMUNICATION

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21:52:29.9

HOT-2 two three three.

21:52:31.0

HOT-1 and I'll brief it that way too.

21:52:32.6

HOT-2 alright it's two three three. [sound of laughter] we're good.

21:52:34.2

HOT-1 that's two three three.

21:52:57.2

HOT-2 alrighty and for the rest of that weather uh three miles. it's snowing with some mist.

21:53:03.5

HOT-1 alright.

21:53:05.7

HOT-2 it didn't give me an RVR.

21:53:07.5

HOT-1 good...it's good.

21:53:10.9

HOT-2 that means it's far enough right?

21:53:13.9

HOT-1 yeah.

21:53:20.3

HOT-2 runway five then what do we have? one two nine two five.

21:53:40.2

HOT-2 alrighty your numbers. for flaps fifteen runway two three are eighteen and fourteen.

21:53:47.5

HOT-1 alrighty eighteen and fourteen.

AIR-GROUND COMMUNICATION

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INTRA-AIRCRAFT COMMUNICATION

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21:53:49.7
HOT-2 we have to go around it's gonna be twenty five and forty five.

21:54:06.7
HOT-2 alrighty. I don't think we had any specials did we?

21:54:12.0
HOT-1 uh I don't believe we did.

21:54:13.6
HOT [sound of double chime]

21:54:16.9
INT-3 hello.

21:54:17.2
INT-2 hey any specials?

21:54:18.6
INT-3 uh no we don't.

21:54:19.8
INT-2 no specials.

21:54:20.6
INT-3 nope.

21:54:20.8
INT-2 we should be there in about twenty twenty five minutes.

21:54:23.0
INT-3 fantastic.

21:54:23.9
INT-2 alright

21:54:24.1
INT-3 thanks bye.

21:54:58.5
HOT-2 yeah I kind of like that I'm so flexible with what I'm doing.

AIR-GROUND COMMUNICATION

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INTRA-AIRCRAFT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
21:55:01.3 CAM	[sound similar to seat track movement]
21:55:03.0 HOT-2	* I have goals but I have such a wide range of goals I don't know exactly what I want.
21:55:05.3 HOT	[sound similar to double chime]
21:55:39.9 HOT-2	oops I think I had two seven six two I think I put half and half. two seven six two yeah. twenty five and then I switched that one. oops.
21:56:08.0 HOT-1	it's just like we're in I don't know just just a light haze or type cloud. I don't know just we can see things out in front of us.
21:56:17.4 HOT-2	do you want to go down?
21:56:18.6 HOT-1	huh? ohh. I was thinking about that.
21:56:26.4 HOT-2	might be easier on my ears if we start going down sooner.
21:56:28.9 HOT-1	yeah we could do it. that's fine.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
21:55:25.0 ZOB	Colgan thirty four zero seven Cleveland.
21:55:28.1 RDO-2	thirty four zero seven go ahead.
21:55:30.2 ZOB	Colgan thirty four zero seven reset your transponder. squawk seven— er uh two seven six two.
21:55:35.6 RDO-2	two seven six two Colgan thirty two— thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:56:35.9
HOT-1 get discretion to twelve.

21:56:44.9
HOT-1 I got your standby.

21:56:46.5
HOT-2 [sound of laughter]

21:57:07.1
HOT-1 we may have to wait for separation on this guy over here.

21:57:10.0
HOT-2 yeah.

21:57:20.5
HOT-2 BENEE at eleven.

21:57:21.3
HOT-1 tooo what was it?

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

21:56:31.6
RDO-2 and Center Colgan thirty four zero seven.

21:56:35.6
ZOB Colgan thirty four zero seven uh say again?

21:56:38.7
RDO-2 oh yeah just can we get PD down to twelve thousand for Colgan thirty four zero seven.

21:56:42.6
ZOB uhh standby.

21:57:10.8
ZOB Colgan thirty four zero seven cross BENEE at maintain one one thousand.

21:57:15.7
RDO-2 BENEE at one one eleven thousand Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

21:57:23.2

HOT-2 BENEЕ.

21:57:23.4

HOT-1 oh BENEЕ.

21:57:25.4

HOT-1 BENEЕ at one one thousand.

21:57:27.2

HOT-2 yes sir.

21:57:34.9

HOT-1 yeah that works.

21:58:31.1

HOT-1 you know we had a a controller down in Houston. uh he was known as Mister Happy.

21:58:37.7

HOT-2 oh yeah.

21:58:38.4

HOT-1 guy was just he was— had a perfect personality for the being a controller. he never let anything rattle him. and he just all just all bubbly type a type a guy. he retired— just to let you know how he— how well respected he was um he retired and he had they published where his retirement party was. there was pilots from Continental Colgan pilots Chautauqua Expressjet you know the main carriers there in Houston.

21:59:09.2

HOT-2 oh that's cool.

21:59:12.3

HOT-1 they all went to go see you know Mister Happy and everything but but that's where I got the bent wing pencil jet.

21:59:19.6

HOT-2 it's where what?

21:59:20.6

HOT-1 that's where I got the bent wing pencil jet uh name from.

AIR-GROUND COMMUNICATION

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CONTENT

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

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CONTENT

21:59:24.7

HOT-2 he calls them that?

21:59:26.4

HOT-1 yeah it was uh Jet Lincoln instead of Jetlink. called em Jet Lincoln and we were Cold One.

21:59:29.0

HOT-2 uh-huh...oh.

21:59:32.4

HOT-1 Cold One nintey five sixty five you'll be following a bent wing pencil jet at your one oh clock. two miles or whatever it was.

21:59:40.9

HOT-2 that's funny.

21:59:42.1

HOT-1 either that or you're following the lawn dart today. let's see uh if it was a CRJ we're following the Barbie Jet.

21:59:45.6

HOT-2 [sound of laughter]

21:59:52.2

HOT-2 the Barbie Jet.

21:59:59.5

HOT-1 or he would say you're following Chi-tak-wa.

22:00:03.3

HOT-1 [sound of laughter]

22:00:04.1

HOT-2 [sound of laughter]

22:00:05.9

HOT-2 the guys that have fun and enjoy their jobs are so much more pleasant to work with.

22:00:09.4

HOT-1 oh yeah.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:00:10.8
HOT-2 yeah.

22:00:16.2
HOT-1 College Station Texas was a a contract control tower.

22:00:23.0
HOT-2 yeah.

22:00:23.2
HOT-1 had a guy that worked in there. had an odd accent to begin with. and uh College Station Airport is uh owned and operated by the university— uh the Texas A and M university.

22:00:39.7
HOT-2 uh-huh.

22:00:49.8
HOT-2 oh.

22:00:51.7
HOT-2 I'm not doing very good by * tonight.

22:00:52.7
HOT-1 it's alright.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

22:00:37.8
ZOB Mesaba thirty forty five contact Cleveland Center one two zero point six.

22:00:43.2
RDO-2 one two zero point six Colgan thirty four zero seven.

22:00:46.2
ZOB nope Colgan thirty four zero seven you stay here. that was for Mesaba.

22:00:54.0
ZOB Colgan thirty four zero seven you still here?

22:00:56.3
RDO-2 yes sir thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

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CONTENT

22:00:59.5

HOT-1 sorry about that. oh anyway he would say Eeeeeeeeastwood information echo.

22:01:08.9

HOT-2 [sound of laughter]

22:01:11.3

HOT-1 and he'd give us he'd give us same type of uh clearance to Houston. Colgan ninety five twenty six you're cleared to the George Herbert Walker er yeah George Herbert Walker Bush Intergalactical Airport.

22:01:27.6

HOT-2 [sound of laughter]

22:01:28.1

HOT-1 instead of Intercontinental. Intergalactical Airport via the College Station zero seven six. baaaseball Rice won. climb maintain seven thousand. departure frequency is Houston Center one two three point seven. squawk whatever you know.

22:01:36.8

HOT-2 [sound of laughter]

22:01:47.6

HOT-2 yeah.

22:01:48.0

HOT-1 and I would try to read it back exactly the same way. went in there I don't know you know about three or four months before I left and he was just all calm and quiet. you know I could tell it was him said hey man what happened to that Eeeeeeeastwood Airport information echo. he said yeah they clipped my wings.

22:02:09.7

HOT-2 oh no. they didn't like him doing that?

22:02:12.3

HOT-1 I said well uh if you need uh if you need any help on that one you just let me know who to call and I'll uh be glad to put in a good word for ya. and he he chuckled. he said uh he said awww let it blow over for a little while and I'll be back I'll be back to my regular self later.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

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CONTENT

22:02:32.1
HOT-2 [sound of laughter]

22:02:32.9
HOT-1 yeah.

22:02:36.4
HOT-1 I just like the flying down there a whole lot better.

22:02:39.1
HOT-2 yeah.

22:02:39.6
HOT-1 see and and in the Saab in the northeast uh you * there's no FMS there's no glass.

22:02:46.9
HOT-2 yeah.

22:02:47.5
HOT-1 and you're you're asses and elbows all the time.

22:02:51.5
HOT-2 yeah.

22:02:52.4
HOT-1 uh because uh you're flying the the victor airways. the uh the VORs are so close together and you're having to go to intersections.

22:03:00.3
HOT-2 yeah.

22:03:00.7
HOT-1 cross radials and all that kind of stuff. and uh it's it's hard work.

22:03:04.8
HOT-2 yeah.

22:03:05.3
HOT-1 down in Houston y— you're more spread out. uh the flying is a whole lot nicer down there the controllers are a whole lot nicer. in Florida the same way.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:03:18.6

HOT-2 yeah Phoenix is like that.

22:03:21.2

HOT-1 man I— it's just all the pressure of all the the congestion and the the volume and weather and anything and everything. the the controllers uh they just it's like they uh constantly have their—.

22:03:41.8

HOT [sound similar to altitude alert]

22:03:45.4

HOT-1 twelve eleven alt sel.

22:03:46.5

HOT-2 twelve eleven alt sel.

22:04:09.1

HOT-2 *.

22:04:09.3

HOT-1 two niner eight zero.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

22:03:38.1

ZOB Colgan thirty four zero seven contact Buffalo Approach one two six point one five.

22:03:42.7

RDO-2 one two six one five Colgan thirty four zero seven.

22:03:53.0

RDO-2 Buffalo Approach Colgan thirty four zero seven twelve for eleven thousand with romeo.

22:03:59.2

APP Colgan forty four zero seven Buff Approach good evening. Buffalo altimeter's two niner eight zero. plan ILS approach runway two three.

22:04:05.1

RDO-2 two niner eight zero and ILS two three Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:04:11.6

HOT-2 eight.

22:04:12.4

HOT-1 and we'll expect two three.

22:04:15.1

HOT-2 yup.

22:04:15.5

HOT-1 and if you've got your charts handy I'll brief it real quick.

22:04:17.7

HOT-2 I'll do.

22:04:19.4

HOT-1 **. alright it's uh gonna be the ILS to uh runway two three at Buffalo. chart eleven two twenty April oh seven.

22:04:28.9

HOT-2 yes sir.

22:04:29.7

HOT-1 got uh eleven three's the frequency set both sides. two thirty three set on my side I saw you set yours. uh glideslope uh final approach fix uh glideslope intercept is at the—.

22:04:45.8

HOT-2 direct—.

22:04:46.2

HOT-1 direct TRAVA.

22:04:50.6

HOT-1 oooh let's see I forget. do I do the do the first one?

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

22:04:39.9

APP Colgan thirty four zero seven proceed direct TRAVA.

22:04:43.2

RDO-2 direct TRAVA Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:04:54.8
HOT-2 I did the first one. it doesn't matter you could do either one. there's no hold in there so—.

22:05:08.2
HOT-2 cranky old guy.

22:05:08.9
HOT-1 six thousand alt sel. that's something I you in in the Saab whoever if the autopilot's engaged you know the pilot flying manipulates that #.

22:05:17.0
HOT-2 yeah...oh yeah.

22:05:20.7
HOT-1 I don't know why we don't do that here but we don't.

22:05:23.2
HOT-2 yeah.

22:05:24.3
HOT-1 alright well if you don't mind I'm gonna go ahead and push her on down at a thousand feet a minute.

22:05:27.0
HOT-2 oh that's okay.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

22:05:00.6
APP Colgan thirty four zero seven descend and maintain six thousand.

22:05:03.8
RDO-2 sorry about that down to six thousand Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

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CONTENT

22:05:29.5

HOT-1 uh continuing on glideslope intercept's the outer marker twenty two oh six that's fourteen uh seventy eight above the ground. DA's nine twenty eight we'll put nine thirty in...it's also two hundred above the ground. touchdown zone elevation is seven twenty eight. highest MSA's south of the outer marker at thirty nine hundred north of the marker is twenty seven. and ALSF two lighting uh missed approach is up to twenty three hundred climbing right turn to three thousand via three hundred heading uh on the uh two six seven radial to BUF VOR. and er outbound on VOR out to WELLA uh which is DME twenty three point one uh hold uh this thing'll probably do a parallel entry. uh we got the weather. bugs are set eighteen fourteen flaps fifteen. uh off of twenty three I forget let me look it up.

22:06:31.0

HOT-2 left.

22:06:32.6

HOT-1 oh sure. I'll do it left turn.

22:06:36.9

HOT-2 left turn.

22:06:37.6

HOT-1 first available.

22:06:38.7

HOT-2 I think so.

22:06:39.9

HOT-1 can I make echo?

22:06:41.3

HOT-2 um I think so.

22:06:42.9

HOT-1 okay.

22:06:45.3

HOT-1 we'll do it. oh #.

22:06:48.7

HOT-2 [sound of laughter]

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:06:50.5
HOT-1 going too far off.

22:06:55.6
HOT-2 yeah you can make echo.

22:06:55.8
HOT-1 *.

22:07:14.2
HOT-2 [sound similar to yawn] alright I'm gonna call in range. I'll be off one for a second.

22:07:16.8
HOT-1 I got one.

22:07:18.3
HOT-2 * two five right? yup.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

22:07:22.1
RDO-2 Ops Colgan thirty four zero seven's in range.

22:07:30.6
OPS thirty four zero seven go for Buffalo ops.

22:07:33.4
RDO-2 yeah we're just letting you know we're in range. uh let's see here looks like we're ten maybe fifteen minutes out.

22:07:39.2
OPS we'll see you in about ten fifteen minutes. gate twenty six. um we do actually have another Colgan turn we're trying to get out uh because they have the adapter we need to meet you guys. um so it might be just a couple minutes when you get here before we can actually bring the jetbridge up to ya.

22:07:54.2
RDO-2 alrighty uh thirty four zero seven we'll be we'll be ready for that thanks.

22:07:58.6
OPS thank you see you then.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

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CONTENT

22:07:59.9

HOT-1 is the other Colgan in?

22:08:02.3

HOT-2 the other Colgan's there right now. and they're trying to turn him and we may have to sit and wait for them to turn him.

22:08:07.4

HOT-1 yeah.

22:08:08.4

HOT-2 that's what she said.

22:08:09.1

HOT-1 how'd they beat us?

22:08:11.8

HOT-2 I don't— they must have taken runway two niner. 'cause they— we we sat there for like forty five minutes without anybody taking off two two.

22:08:27.5

HOT-1 alrighty.

22:08:41.0

HOT-2 alrighty **.

22:08:41.4

APP Colgan thirty four zero seven descend and maintain five thousand.

22:08:45.0

RDO-2 five thousand Colgan thirty four zero seven.

22:08:47.9

HOT-1 five thousand alt sel.

22:08:48.9

HOT-2 five thousand alt sel I'm off one.

22:08:50.2

HOT-1 I've got one.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

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CONTENT

22:08:51.1

PA-2 folks from the flight deck your first officer speaking uh it looks like at this time we're about ten maybe fifteen minutes outside of Buffalo. weather in Buffalo is uh pretty foggy. uh snowing a little bit there it's not too terribly cold uh but uh at this time I'd like to make sure everybody remains in their seats so the flight attendants can prepare the cabin for arrival. thank you.

22:09:10.6

HOT-2 alrighty I'm back on one.

22:09:12.1

APP Colgan thirty four zero seven descend and maintain four thousand.

22:09:15.6

RDO-2 and four thousand Colgan thirty four zero seven.

22:09:15.9

PA-3 ladies and gentlemen in preparation for landing in Buffalo please be certain your seatback is straight up and your seatbelt is fastened. please pass any remaining service items and unwanted reading materials to us as we pass through the cabin. please turn off all portable electronic devices and stow them until we have reached the gate. after landing Continental Connection allows passengers to use cell phones. I will make an announcement when it is safe to use this device. if you plan to use your cell phone please ensure it's accessible since personal items must be stowed until we reach the gate.

22:09:17.8

HOT-1 four thousand alt sel.

22:09:18.8

HOT-2 four thousand.

22:09:26.0

HOT-1 how's the ears?

22:09:27.3

HOT-2 uh they're stuffy.

22:09:31.6

HOT-1 are they poppin?

INTRA-AIRCRAFT COMMUNICATION

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CONTENT

22:09:32.7

HOT-2 yeah.

22:09:33.3

HOT-1 okay. that's a good thing.

22:09:35.7

HOT-2 yeah I wanta make em pop. [sound of laughter]

22:10:22.6

HOT-2 is that ice on our windshield?

22:10:25.6

HOT-1 got it on my side. you don't have yours?

22:10:28.7

HOT-1 * [sound of whistle]

22:10:30.5

CAM [sound of click]

22:10:32.3

HOT-2 oh yeah oh it's lots of ice.

22:10:47.5

HOT-1 oh yeah that's the most I've seen— most ice I've seen on the leading edges in a long time. in a while anyway I should say.

22:10:51.4

HOT-2 oh *.

22:10:57.7

HOT-2 yeah that's another thing. all the guys— @ came in to our when we interviewed and he said oh yeah you'll all be upgraded in six months into the Saab and blah ba blah ba blah and I'm thinking you know what. flying in the northeast I've sixteen hundred hours. all of that in Phoenix how much time do you think actual I had or any in in ice. I had more actual time on my first day of IOE than I did in the sixteen hundred hours I had when I came here.

22:11:21.0

HOT-1 [sound of laughter]

AIR-GROUND COMMUNICATION

**TIME and
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CONTENT

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:11:22.2

HOT-2 I'm not even kidding. the first day.

22:11:25.7

HOT-1 well that sounds— well I mean I didn't have sixteen hundred hours.

22:11:27.5

HOT [sound similar to altitude alert]

22:11:28.9

HOT-1 five for four alt sel.

22:11:29.8

HOT-2 five four alt sel.

22:11:31.5

HOT-1 but uh as a matter of fact I got hired with about six hundred and twenty five hours here.

22:11:37.6

HOT-2 oh wow.

22:11:39.4

HOT-1 uh.

22:11:39.9

HOT-2 that's not much for uh back when you got hired.

22:11:42.5

HOT-1 no but uh out of that six and a quarter two hundred fifty hours was uh part one twenty one turbine. multi engine turbine.

22:11:50.0

HOT-2 oh that's right yeah.

22:11:54.3

HOT-2 no but all these guys are complaining they're saying you know how we were supposed to upgrade by now and they're complaining I'm thinking you know what? I really wouldn't mind going through a a winter in the northeast before I have to upgrade to captain.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:12:04.0
HOT-1 no no.

22:12:05.0
HOT-2 I've never seen icing conditions. I've never deiced. I've never seen any— I've never experienced any of that. I don't want to have to experience that and make those kinds of calls. you know I'dve freaked out. I'dve have like seen this much ice and thought oh my gosh we were going to crash.

22:12:25.1
HOT-2 um two three alt sel.

22:12:27.4
HOT-2 I've got you in pitch pitch hold. I don't know if that's what you want.

22:12:27.6
HOT-1 two three alt sel.

22:12:29.6
HOT-1 yeah that's alright. let's uh— we'll do vertical speed back.

22:12:33.3
HOT-2 but I'm glad to have seen oh— you know now I'm so much more comfortable with it all.

22:12:37.6
HOT-1 yeah uh I I spent the first three months in uh Charleston West Virginia and uh flew—.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

22:12:17.7
APP Colgan thirty four oh seven descend and maintain two thousand three hundred.

22:12:21.8
RDO-2 okay down to two thousand three hundred Colgan thirty four zero seven.

22:12:43.5
APP Colgan thirty four zero seven turn left heading three three zero.

22:12:47.0
RDO-2 left heading three three zero Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

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CONTENT

22:12:49.3

HOT-1 left three three zerooo. we're in heading mode now. go to blue needles.

22:13:01.2

HOT-1 but I— first couple of times I saw the amount of ice that that Saab would would pick up and keep on truckin'.

22:13:05.9

HOT-2 yeah.

22:13:08.0

HOT-1 saw it out on the spinner. ice comin' out about that far my eyes about that big around. I'm going gosh. I mean Florida man— barely a little you know out of Pensacola.

22:13:09.3

HOT-2 yeah.

22:13:14.2

HOT-2 holy cow...oh my gosh...oh yeah.

22:13:18.0

HOT [sound similar to altitude alert]

22:13:21.4

HOT-1 that's uh thirty three for twenty three alt sel.

22:13:24.1

HOT-2 thirty three for twenty three alt sel.

22:13:24.8

HOT-1 let's do a descent checklist please.

22:13:25.9

HOT-2 do a descent checklist. altimeters two niner eight zero set crosschecked.

22:13:29.1

HOT-1 twenty nine eighty set crosschecked.

22:13:30.8

HOT-2 fuel balance check. pressurization set and cabin PA complete. descent checklist complete.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:13:35.7
HOT-1 alright if you want to go ahead we can do the approach checklist along with it.

22:13:37.4
HOT-2 yeah sure. um approach checklist approach and landing brief complete.

22:13:41.6
HOT-1 uh complete.

22:13:42.3
HOT-2 bugs set.

22:13:43.3
HOT-1 set.

22:13:44.3
HOT-2 GPWS landing flaps selected fifteen degrees. fuel transfer off hydraulic pressure and quantity check. caution warning lights check seatbelt sign on and external lights on. approach checklist complete.

22:13:54.7
HOT-1 rock and roll.

22:13:58.4
HOT-1 oh yeah— I'm so glad. I would've— I w— I mean—. I would've been been fine. I would have survived it. there wasn't— we n— never had to make decisions that I wouldn't have been able to make but...now I'm more comfortable.

22:14:12.7
CAM [sound similar to engine power increase]

22:14:14.6
HOT-1 three one zero.

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

22:14:08.5
APP Colgan thirty four zero seven turn left heading three one zero.

22:14:12.1
RDO-2 left heading three one zero for Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
22:14:16.6 HOT-2	yeah.
22:14:22.6 HOT-1	alright let's see if I can get this seat...sited...that's alright there.
22:14:24.7 CAM	[sound similar to seat track movement]
22:14:32.7 HOT-1	still trying to find that sweet spot I guess there *.
22:14:39.8 CAM	[sound similar to engine power increase]
22:15:06.3 HOT-1	flaps five.
22:15:08.1 HOT-2	what?
22:15:08.8 HOT-1	flaps five please.
22:15:10.0 HOT-2	oh *.
22:15:11.2 CAM	[sound similar to flap handle movement]
22:15:31.7 HOT-1	alright approach is armed.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
22:15:13.5 APP	Colgan thirty four zero seven three miles from KLUMP turn left heading two six zero maintain two thousand three hundred until established localizer. cleared ILS approach runway two three.
22:15:22.2 RDO-2	left two sixty two thousand three hundred 'til established and cleared ILS two three approach Colgan thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

TIME and SOURCE

CONTENT

22:15:32.8

HOT-2 roger.

22:15:59.5

CAM [sound similar to decrease in engine power]

22:16:04.1

HOT-1 gear down...loc's alive.

22:16:06.2

CAM [sound similar to landing gear handle movement]

22:16:07.4

CAM [sound similar to landing gear deployment]

22:16:14.9

HOT [sound of two double chimes]

22:16:21.2

HOT-2 gear's down.

22:16:23.5

HOT-1 flaps fifteen before landing checklist.

22:16:26.0

CAM [sound similar to flap handle movement]

22:16:26.6

HOT-2 uhhh.

22:16:27.4

CAM [sound similar to stick shaker lasting 6.7 seconds]

22:16:27.7

HOT [sound similar to autopilot disconnect horn repeats until end of recording]

AIR-GROUND COMMUNICATION

TIME and SOURCE

CONTENT

22:16:06.4

APP Colgan thirty four zero seven contact tower one two zero point five. have a good night.

22:16:11.5

RDO-2 over to tower you do the same thirty four zero seven.

INTRA-AIRCRAFT COMMUNICATION

**TIME and
SOURCE**

CONTENT

22:16:27.9
CAM [sound of click]

22:16:31.1
CAM [sound similar to increase in engine power]

22:16:34.8
HOT-1 Jesus Christ.

22:16:35.4
CAM [sound similar to stick shaker lasting until end of recording]

22:16:37.1
HOT-2 I put the flaps up.

22:16:40.2
CAM [sound of two clicks]

22:16:42.2
HOT-1 [sound of grunt] *ther bear.

22:16:45.8
HOT-2 should the gear up?

22:16:46.8
HOT-1 gear up oh #.

22:16:50.1
CAM [increase in ambient noise]

22:16:51.9
HOT-1 we're down.

22:16:51.9
CAM [sound of thump]

22:16:52.0
HOT-2 we're [sound of scream]

22:16:53.9
**END OF TRANSCRIPT
END OF RECORDING**

AIR-GROUND COMMUNICATION

**TIME and
SOURCE**

CONTENT