

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



GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

ERA17FA066

**By
Bill Tuccio, Ph.D.**

WARNING

The reader of this report is cautioned that the transcript of a cockpit voice recorder audio recording is not a precise science but is the best product possible from a Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

January 24, 2017

Cockpit Voice Recorder

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

1. EVENT SUMMARY

Location: Camilla, Georgia
Date: December 05, 2016
Aircraft: Fairchild SA227-AC, Registration N765FA
Operator: Key Lime Air Corp, Flight 308
NTSB Number: ERA17FA066

On December 5, 2016, about 2222 eastern standard time (EST), a Fairchild SA227-AC, N765FA, operating as Key Lime Air Flight LYM308, was destroyed during a descent and subsequent inflight breakup near Camilla, Georgia. The airline transport pilot was fatally injured. Night instrument meteorological conditions prevailed and an instrument flight rules flight plan was filed. The flight originated at Northwest Florida Beaches International Airport (ECP) Panama City, Florida and was destined for Southwest Georgia Regional Airport (ABY) Albany, Georgia. The on-demand cargo flight was conducted under the provisions of 14 *Code of Federal Regulations* Part 135. A tape cockpit voice recorder (CVR) was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for evaluation. The CVR group meeting convened on January 17, 2017, and a partial transcript was prepared for the 30-minute tape recording (see attached).

2. GROUP

Chairman:	Dr. Bill Tuccio Aerospace Engineer NTSB
Member:	Adam Gerhardt Air Safety Investigator NTSB
Member:	David A. Gerlach Senior Air Safety Accident Investigator Federal Aviation Administration
Member:	Jay Eller Air Safety Investigator Honeywell Aerospace

Member: Jim Norton
Product Manager
Elbit Systems of America¹

Member: Clifford D. Honeycutt
President
Key Lime Air Corp

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model: **Fairchild A-100A**
Recorder Serial Number: **54881**

3.1 CVR Carriage Requirements

Per federal regulation, the aircraft was operating single pilot under 14 CFR Part 135 with no passenger seats; thus, it was not required to have a CVR installed.²

3.2 Recorder Description

This model CVR, the Fairchild A-100A, records a minimum of 30 minutes of analog audio on a continuous loop tape in a four-channel format: one channel for each flight crew, one channel for a cockpit observer, and one channel for the cockpit area microphone (CAM).

3.3 Recorder Damage

Upon arrival at the laboratory, it was evident that the exterior of the CVR had sustained structural damage, as shown in figure 1. The outer case was removed and the interior crash-protected case did not appear to have any significant structural damage, as shown in figure 2. The crash-protected case was opened and revealed damage to part of the tape, as shown in figures 3 and 4. The magnetic tape was retrieved from within the crash-protected case and was successfully read out, with minor distortion audible in limited portions of the 30-minute recording.

¹ Elbit Systems of America owns M7 Aerospace LLC, which acquired the Type Certificate Data Sheet for the Fairchild SA227-AC aircraft.

² See FAA Assistant Chief Counsel for Regulations (AGC-200) interpretation April 16, 2008, in response to an inquiry from George Dukats, Australia Civil Aviation Authority.

Figure 1. CVR as received.



Figure 2. Crash-protected case.



Figure 3. Tape housing inside crash-protected case.

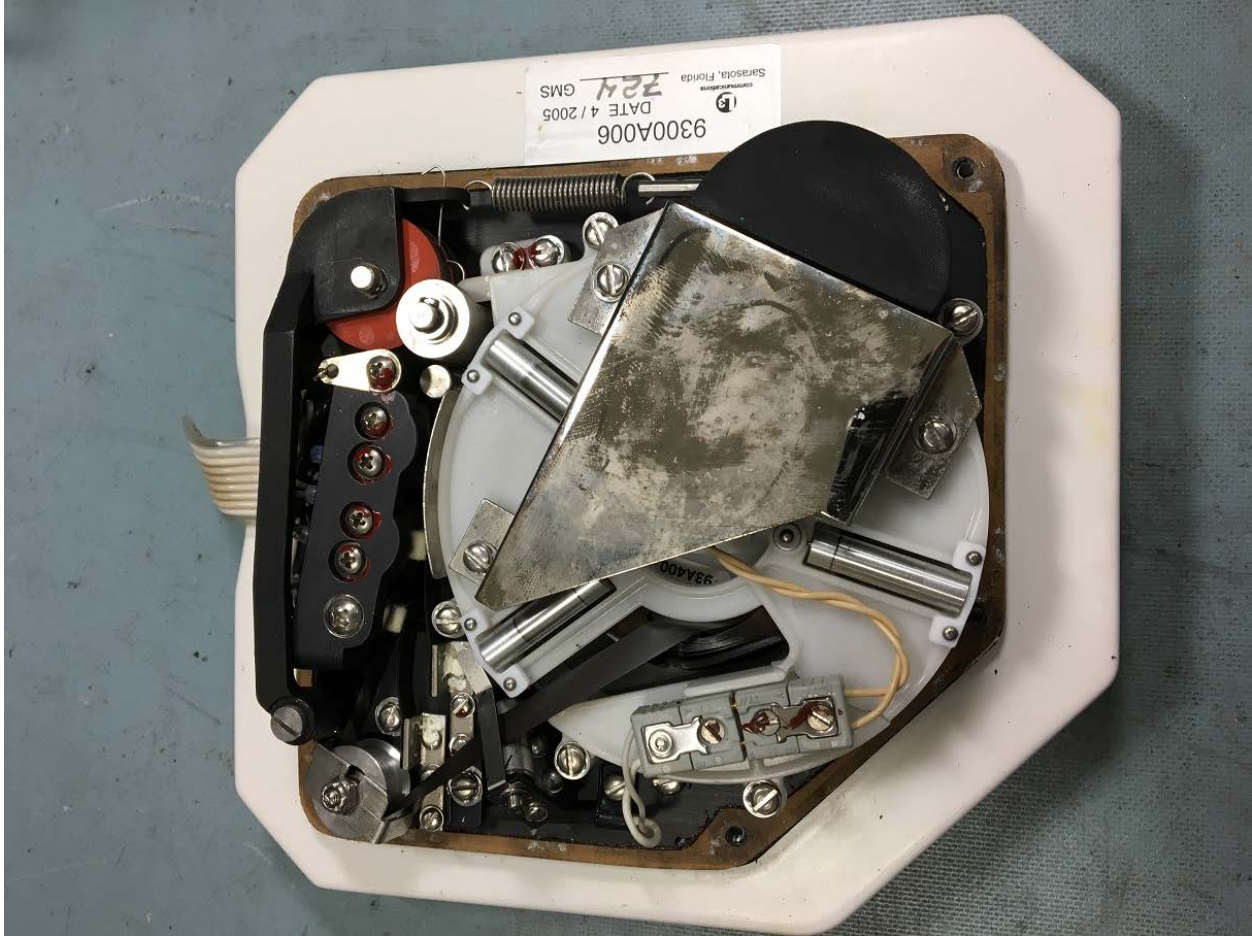
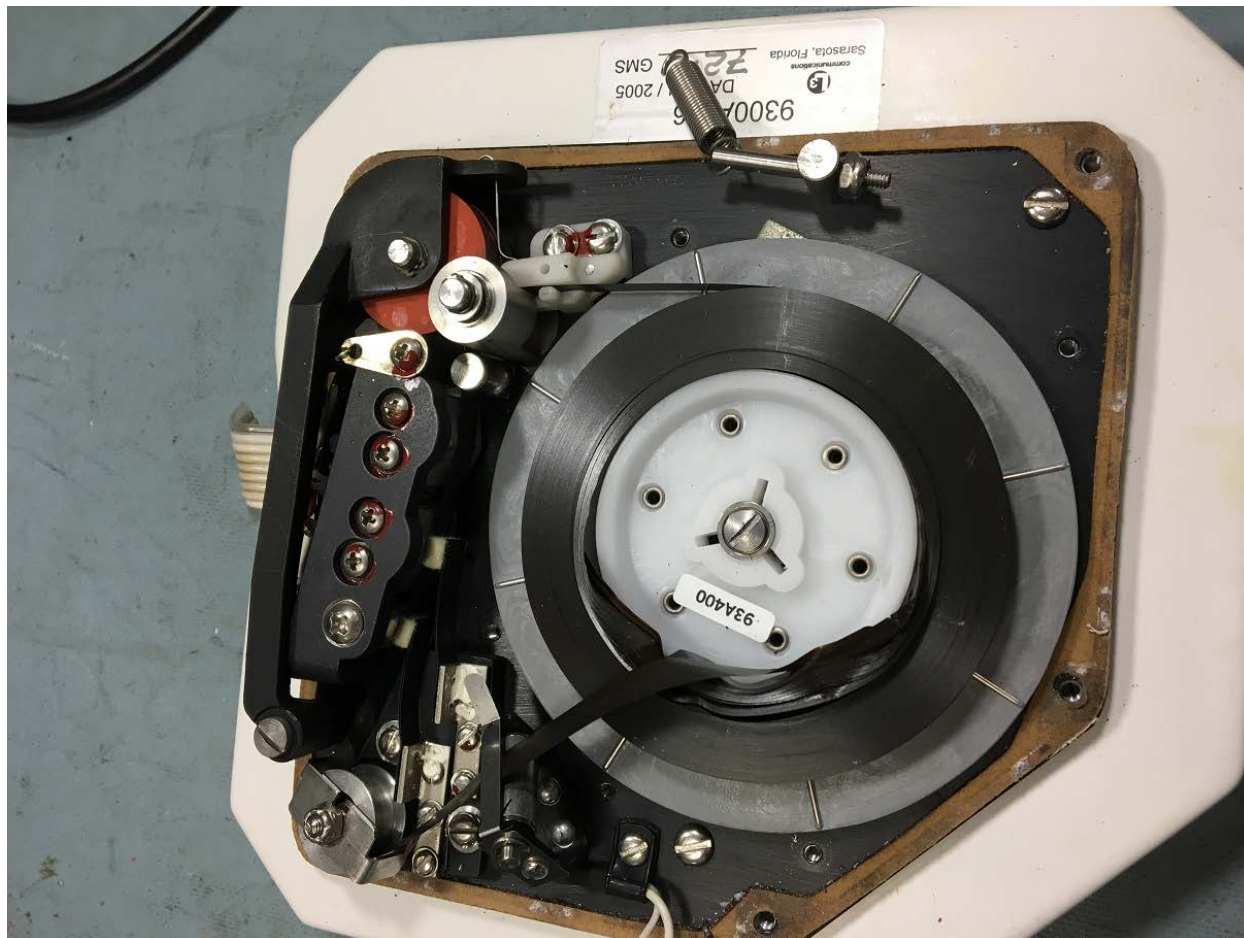


Figure 4. Damaged tape on spool.



3.4 Audio Recording Description

Each channel's audio quality is indicated in Table 1.³

Table 1. Audio Quality.

Channel Number	Content/Source	Quality	Duration
1	Unknown	Excellent	30 minutes
2	CAM	Good	30 minutes
3	Pilot	Excellent	30 minutes
4	Unknown	Excellent	30 minutes

3.5 Timing and Correlation

Timing on the transcript was established by correlating two Jacksonville Center air traffic control (ATC) recorded transmission times to corresponding CVR-recorded transmission times. Specifically, the first time the aircraft contacted Jacksonville Center and the last time Jacksonville Center attempted to contact the aircraft at 0315:24 UTC (1,543.5 seconds CVR Elapsed Time) and 0322:16 UTC (1,973.2 seconds CVR Elapsed Time), respectively. The elapsed time between the ATC recorded times was 414.8 seconds versus 429.7 seconds for the CVR elapsed time. This difference was

³ See attached CVR Quality Rating Scale.

attributed to the improper playback (and/or recording) speed of the CVR tape. Accordingly, the CVR digitized audio was compressed by a factor of 0.9653 to align with ATC elapsed time. Thereafter, the ATC transmission at 0315:24 UTC was converted to EST by subtracting 5 hours. Accordingly, 2150:31.3 was added to CVR Elapsed Time (after audio compression) to convert to EST.

3.6 Description of Audio Events

The recording began when the aircraft was on the ground at ECP at 2151 EST. Key Lime 308 received an IFR clearance to ABY. The aircraft departed ECP at about 2154 EST and initially received radar vectors for a climb to 7,000 feet. Throughout the recording, the recorded weather observations (either ECP or ABY) were playing on CVR Channels 1, 3, and 4; the volume on Channel 1 was louder than that of Channels 3 and 4.

At about 2155:37 EST, Key Lime 308 requested routing to “catch that corridor” and was given radar vectors direct RENOE then ABY. Deviations around weather were approved left or right.

At about 2201 EST, Tyndall approach asked Key Lime 308 to say flight conditions. Key Lime 308 reported “in and out of it” and light to moderate chop. Key Lime 308 then asked Tyndall approach to add Tallahassee airport as the alternate airport on his IFR flight plan.

At about 2204 EST, Key Lime 308 changed frequencies to Tallahassee Approach and checked in at 7,000 feet. Tallahassee Approach reported “the only weather I show is north of RENOE, area of weather is moving to the north.”

The transcript began at 2214:45 EST and continued until the end of the recording at 2222:32 EST. Where not otherwise noted, the background sound of the engine oscillated, similar to the aircraft operating in some degree of turbulence.

Sounds of precipitation could not be uniquely identified in the recording.

Attachment I

CVR Quality Rating Scale

The levels of recording quality are characterized by the following traits of the cockpit voice recorder information:

Excellent Quality	Virtually all of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate only one or two words that were not intelligible. Any loss in the transcript is usually attributed to simultaneous cockpit/radio transmissions that obscure each other.
Good Quality	Most of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate several words or phrases that were not intelligible. Any loss in the transcript can be attributed to minor technical deficiencies or momentary dropouts in the recording system or to a large number of simultaneous cockpit/radio transmissions that obscure each other.
Fair Quality	The majority of the crew conversations were intelligible. The transcript that was developed may indicate passages where conversations were unintelligible or fragmented. This type of recording is usually caused by cockpit noise that obscures portions of the voice signals or by a minor electrical or mechanical failure of the CVR system that distorts or obscures the audio information.
Poor Quality	Extraordinary means had to be used to make some of the crew conversations intelligible. The transcript that was developed may indicate fragmented phrases and conversations and may indicate extensive passages where conversations were missing or unintelligible. This type of recording is usually caused by a combination of a high cockpit noise level with a low voice signal (poor signal-to-noise ratio) or by a mechanical or electrical failure of the CVR system that severely distorts or obscures the audio information.
Unusable	Crew conversations may be discerned, but neither ordinary nor extraordinary means made it possible to develop a meaningful transcript of the conversations. This type of recording is usually caused by an almost total mechanical or electrical failure of the CVR system.

Transcript of a Fairchild A-100A tape cockpit voice recorder, serial number 54881, installed on an Key Lime Air Fairchild SA227-AC (N765FA), which crashed in Camilla, Georgia.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
RDO	Radio transmissions from N765FA
CTR	Radio transmission from Jacksonville center controller
APR	Radio transmission from the Tallahassee approach controller
ATIS-ECP	Automatic Terminal Information Service at ECP airport
ASOS-ABY	Automated Surface Observing System at ABY airport
-1	Voice identified as the pilot
*	Unintelligible word
()	Questionable insertion
[]	Editorial insertion

Note 1: Times are expressed in eastern standard time (EST).

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

21:51 EST
START OF RECORDING

22:14:45 EST
START OF TRANSCRIPT

22:15:02.5
HOT [sound of beep, similar to radio frequency change alert]

22:15:06.2
HOT [sound of beep, similar to radio frequency change alert]

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

22:14:45.9
ATIS-ECP [ECP ATIS continues to play (since departure) on CH 1 and low volume on CH 3 & 4]

22:14:47.9
APR Key Lime three zero eight contact Jacksonville Center on one two five point seven five.

22:14:54.8
RDO-1 ('right) Jax on twenty five seventy five Key Lime three oh eight goodnight.

22:15:06.2
ASOS-ABY visibility two and one half light rain mist. sky condition broken two thousand three hundred. broken one two thousand. temperature one six Celsius. dewpoint one six Celsius...

22:15:20.4
RDO-1 and Jax ah Key Lime...three zero eight we're checking in here at seven thousand. we're direct Albany now.

22:15:22.2
ASOS-ABY ...altimeter two niner eight two. remarks density altitude five ** ...

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

22:16:00.3
CAM [sound of two clicks]

22:15:27.6
CTR Key Lime three zero eight Jax Center there is a ragged line of moderate heavy and extreme precip all on this side of Albany. I don't show any breaks. ah just continue deviating whenever ah [stammer] when able direct Albany. let me know if you are ready for lower Key Lime three oh eight.

22:15:29.3
ASOS-ABY *** [obscured by talk with CTR] *** five point seven five...

22:15:43.4
ASOS-ABY *** [obscured by talk with CTR] zero three one five zulu wind zero niner...

22:15:43.6
RDO-1 okay ye'ah we can go ahead and take lower now and ah...if you can help us ah pick through that. we got weather-weather radar on board but ah...any help we can get it'll be...greatly appreciated.

22:15:54.8
CTR Key Lime three zero eight like I said I don't show any breaks uhm...there's a weaker a- point...but you'd have to be on a zero four five heading for thirty or forty miles before making that turn. there's a...pretty solid line of extreme precip between you and the Albany right now. and discretion three thousand.

22:16:12.4
RDO-1 a'right discretion to three thousand we're vacating ah seven at this time for Key Lime three oh eight.

22:16:17.1
ASOS-ABY ...zero at one four. visibility two and one half light rain mist. sky condition broken two thousand three hundred. broken one two thousand. temperature one six Celsius. dewpoint one six Celsius. altimeter two niner eight two. remarks *** [obscured by radio communications] *** ...

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

22:16:18.0
CAM [sound of one beep, similar to trim in motion alert]

22:16:30.6
CAM [sound of change in background sound, similar to power oscillation and/or change]

22:16:53.2
CAM [sound of one beep, similar to trim in motion alert]

22:17:00.3
CAM [sound of one beep, similar to trim in motion alert]

22:17:04.1
HOT-1 ahhhh let's see here.

22:17:16.6
CAM [sound of one beep, similar to trim in motion alert]

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

22:16:41.0
CTR Key Lime three zero eight I don't know if you have the gas. but ah...if you were gonna stay east of that line. and continued on a zero five zero heading for...about seventy miles that's the weakest point right there to be able to swing back around towards Albany.

22:16:56.5
ASOS-ABY if unable to reach Jacksonville Center on one two five point seven five contact Jacksonville Center on phone line nine zero four. five four nine. one five four nine. Albany common traffic advisory frequency one two zero point *** [obscured by radio communications] use caution **. p-z-d v-o-r out of service...

22:17:08.4
RDO-1 ah we do have the fuel ah but we're gonna see what we can look-let's see what it looks like when we get down to about three thousand and ah...(but) ah see what the radar's paintin' then.

22:17:17.1
CTR alright sir.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

22:18:23.3
CAM [sound of rustles and engine oscillations, similar to turbulence]

22:18:25.5
HOT-1 * [exhale]

22:18:30.0
HOT-1 [faint, similar to whisper] help (me. lord help me).

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

22:17:20.7
ASOS-ABY ...Albany Southwest Georgia Regional Airport. automated weather observation zero three one six zulu. wind zero niner zero at one five. visibility three light rain mist. sky condition broken two thousand three hundred. broken one two thousand. temperature one six Celsius. dewpoint one six Celsius. altimeter two niner eight one. remarks density altitude five hundred. Albany Tower hours of operation zero hundred local until twenty * hundred local. the common traffic advisory frequency and pilot controlled lighting is available on one two zero point two five. for additional information contact Jacksonville Center on one two five point seven five. [remarks continue].

[AWOS summarized for remainder of recording; transcribed for last repetition at end of recording]

22:18:32.7
ASOS-ABY [0318Z wind 090 at 14 knots/visibility 5/light rain mist/sky 2,400 BKN; 12,000 BKN/temp 16C/dewpoint 16C/altimeter 29.82/density altitude 500/remarks]

22:18:36.7
CTR Key Lime three zero eight Jax.

22:18:38.4
RDO-1 and three zero eight go ahead.

22:18:40.2
CTR I'm sorry I just lost you on radar. I don't show a transponder. might have to do with the weather.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

22:18:45.6
CAM [sound of rustles and engine oscillations (more intense than 20 seconds ago), similar to turbulence]

22:18:56.8
CAM [sound of rustling and engine oscillations (more intense than 10 seconds ago), similar to turbulence]

22:19:02.8
CAM [sound of loud clank]

22:19:17.2
CAM [sound of chime, similar to altitude alerter]

22:19:25.9
CAM [sound of click]

22:19:34.9
CAM [sound of two beeps, similar to trim in motion]

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

22:19:20.7
RDO-1 and we're gonna have to deviate towards the right here a little bit I think [during transmission, variation in voice frequency, similar to talk during turbulence].

22:19:28.3
CTR I'm sorry. say again.

22:19:29.5
RDO-1 ah we're deviating a little bit here to the right we got a-roll out on a zero six zero heading for Key Lime three oh eight.

22:19:35.0
CTR * three zero eight roger. left and right as needed. and ah once we- if we can get you on the other side of that line we'll have vectors for the i-l-s for ya.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

22:19:37.3
CAM [sound of prior rustling and engine oscillations continues]

22:19:57.6
CAM [sound of 3 loud clanks (intensity similar to clank of about 1 minute ago)]

22:19:58.4
HOT-1 [faint, similar to whisper] help me [exhale].

22:20:05.5
HOT-1 [faint, similar to whisper] just keep me up. just keep me up [exhale].

22:20:06.2
CAM [sound of two beeps, similar to trim in motion]

22:20:09.4
CAM [sound of clank and rustle (intensity greater than clank of about 10 seconds ago)]

22:20:12.2
CAM [sound of 2 seconds of rustling, clanking (intensity greater than 2 seconds ago)]

22:20:13.3
HOT-1 [faint, similar to whisper] help me.

22:20:22.4
CAM [sound of engine oscillations followed by loud clank (similar intensity to 10 seconds ago)]

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

22:19:44.5
ASOS-ABY [0319Z/wind 100 at 13 knots/visibility 6/light rain mist/2,400 BKN; 12,000 BKN/temp 16C/dewpoint 16C/altimeter 29.82/remarks]

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

22:20:28.8
RDO-1

[faint, low volume] and Jax ah Key Lime three zero eight we're gonna ah need a turn back around to Tallahassee [during transmission, variation in voice frequency, similar to talk during turbulence].

22:20:34.8
CTR

Key Lime three zero eight you want to return to Tallahassee Airport?

22:20:37.7
RDO-1

[faint, low volume] affirm sir [during transmission, variation in voice frequency, similar to talk during turbulence].

22:20:38.9
CTR

Key Lime three zero eight cleared to the Tallahassee Airport via present position direct. maintain three thousand for now.

22:20:45.2
RDO-1

[faint, low volume] alright present position ahhh direct ah Tallahassee and ah...try to maintain three thousand here.

22:20:52.1
CTR

did you want to climb back up? I can offer any altitude you want Key Lime three oh eight.

22:20:56.1
RDO-1

[faint, low volume] alright we'll ah...see if we can get it up to about...three thousand...(er ah) ** (five).

22:20:58.3
ASOS-ABY

[0320Z/wind 100 at 13 knots/visibility * */2,600 SCT; 12,000 BKN/temperature 16C/dewpoint 16C/altimeter 29.81/density altitude 500/remarks]

22:21:05.4
CTR

Key Lime three zero eight three thousand's approved. ah recommend a heading of about one eight zero. that should get you clear of the weather quicker.

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

22:21:29.5
CAM [background sound loudness begins to increase]

22:21:35.6
CAM-1 **.

22:21:41.0
CAM [sound of chime, similar to altitude alerter]

22:21:41.6
HOT-1 [faint] oh *.

22:21:46.6
HOT-1 [faint] oh *.

22:21:51.8
CAM-1 [faint] (oh Jesus. help me Jesus. help me. help me Jesus. help me. help me Jesus. help me Jesus).

22:21:52.0
CAM [sound of one beep, similar to trim in motion]

22:21:53.7
CAM [sound of chime, similar to altitude alerter]

22:21:54.5
CAM [background sound decreases (from prior increase)]

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

22:21:14.9
RDO-1 [faint, low volume] alright we're * one eight zero Key Lime three oh eight.

22:22:06.1
ASOS-ABY Albany Southwest Georgia Regional Airport automated weather observation. zero three two one zulu. ** at one three. visibility *. thunderstorm in vicinity. rain *. sky condition *. one two thousand-- [ASOS ends 2 seconds before end of recording].

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

22:22:08.9

CAM [background sound increases]

22:22:14.3

CAM-1 oh Jesus please help me.

22:22:15.9

CAM [sound of chime, similar to altitude alerter]

22:22:17.9

CAM [sound of two rustlings over 3 seconds and increase in background sound]

22:22:21.7

CAM [sound of multiple rustling and decrease in engine sound, similar to engine power decrease]

22:22:23.5

CAM [sound of 0.4 seconds of silence, similar to splice or damage in CVR tape]

22:22:25.3

CAM [sound of oscillations in engine sound until end of the recording]

22:22:25.5

HOT-1 no no...no ** no.

22:22:29.0

HOT [sound of mid-level tone for 3.0 seconds until end of recording]

22:22:30.5

HOT [sound of high pitch tone for 1.4 seconds]

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

22:22:15.8

CTR Key Lime three zero eight it looks like you're doing some circling out there. see if you can't fly due south sir.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

**END OF TRANSCRIPT
END OF RECORDING
22:22:32 EST**