

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



GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

ERA14FA300

**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

September 9, 2014

Cockpit Voice Recorder

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

A. EVENT

Location: Huntsville, Alabama
Date: June 18, 2014
Aircraft: Israel Aircraft Industries 1124A, N793BG
Operator: SynFuels Holdings Finance LLC
NTSB Number: ERA14FA300

B. GROUP

A group was convened on August 27, 2014.

Chairman: Dr. Bill Tuccio
Aerospace Engineer
National Transportation Safety Board

Member: Patrick A. Hempen
Air Safety Investigator
Federal Aviation Administration

Member: Dan Helfman
Test Pilot
Israel Aircraft Industries Ltd.

Member: Bill Siegel
Chief Pilot
SynFuels Holdings Finance LLC

Member: Jay Eller
Air Safety Investigator
Honeywell

C. SUMMARY

On June 18, 2014, about 1424 central daylight time (CDT), an Israel Aircraft Industries 1124A, N793BG, crashed into a field during takeoff from Huntsville International Airport-Carl T. Jones Field, Huntsville, Alabama. The airline transport rated check pilot, airline transport rated pilot, and airline transport rated pilot-passenger were fatally injured; the airplane was destroyed by impact and a post-crash fire. The airplane was registered to and operated by SynFuels Holdings Finance LLC, under the provisions of 14 *Code of Federal Regulations* Part 91 pilot proficiency flight. Visual meteorological conditions prevailed at the time and no flight plan was filed for the flight, which was originating at the time of the accident. The CVR group meeting convened and a full transcript was prepared for the 30-minute recording (see attached).

D. DETAILS OF INVESTIGATION

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

Recorder Manufacturer/Model: **Fairchild GA-100**
Recorder Serial Number: **01524**

Recorder Description

Per Federal regulation 14 CFR 91.609(e), multi-engine turbine aircraft with six passengers or more requiring two pilots must be equipped with a CVR that records 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 of CVR operation. This model CVR, the Fairchild GA-100, records 30 minutes of analog audio on a continuous loop tape in a four-channel format: one channel for each flight crew and one channel for the cockpit area microphone (CAM).

Recorder Damage

Upon arrival at the audio laboratory, it was evident that the CVR had sustained heat damage, as shown in figure 1. The tape was removed from the CVR and the audio information was extracted from the recorder normally, without difficulty.

Figure 1. CVR recovered from aircraft.



Audio Recording Description

The 30-minute recording consisted of four channels of audio information. Each channel's audio quality* is indicated in Table 1.

Table 1: Audio Quality

Channel Number	Content/Source	Quality
1	Check Pilot	Excellent
2	CAM	Good
3	Captain	Excellent
4	Unknown	Unusable

Timing and Correlation

The playback speed of the tape-based recording was adjusted and verified by comparing air traffic control (ATC) recordings of transmissions with common events on the CVR.

Timing of the transcript was established by correlating an ATC recording with a corresponding CVR recorded event. Specifically, an ATC recorded transmission by N793BG at 1922:34 UTC was aligned with the same transmission recorded on the CVR at 0028:24.5 CVR Elapsed Time (time from the beginning of the recording). Aligning these two recordings and subtracting 5 hours to convert from UTC to CDT resulted in the following relationship:

$$\text{CDT} = 1354:09.5 + \text{CVR Elapsed Time}$$

* See attached CVR Quality Rating Scale.

Description of Audio Events

The aircraft had three pilots on board. For the purpose of this report they are identified as follows:

- check airman;
- first captain; and
- second captain.

The recording began when the aircraft was practicing an instrument approach to the Huntsville Airport. The check airman was the monitoring pilot and the first captain was the flying pilot. The second captain was a passenger.

After a practice missed approach and subsequent approach and landing, the first captain swapped with the second captain; the first captain became a passenger and the second captain a cockpit crewmember.

The aircraft subsequently crashed during takeoff when the second captain and the check airman were the crewmembers.

Attached is the full transcript of the 30-minute recording from 1354:21 CDT to 1424:29 CDT.

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 GA-100 tape-based cockpit voice recorder, serial number 01524, installed on a SynFuels Holdings Finance LLC Israel Aircraft Industries 1124A (N793BG), which crashed during takeoff from the Huntsville International Airport-Carl T. Jones Field, Huntsville, Alabama.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
RDO	Radio transmissions from N793BG
APR	Radio transmission from the Huntsville approach controller
TWR	Radio transmission from the Huntsville airport tower controller
GND	Radio transmission from the Huntsville airport ground controller
EGPWS	Enhanced Ground Proximity Warning System
TCAS	Traffic Collision Avoidance System
-1	Voice identified as the check airman
-2	Voice identified as the first captain (flying prior to the accident)
-3	Voice identified as the second captain (flying during the accident)
-?	Voice unidentified
*	Unintelligible word
#	Expletive
()	Questionable insertion
[]	Editorial insertion

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

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

13:54:09.5 CDT
START OF RECORDING
START OF TRANSCRIPT

13:54:21.4
HOT [sound of tone, similar to trim in motion]

13:54:27.7
HOT-1 well. I'm going to have to have a chart or somethin' to put in the windows because you can't you can't be doin' V-F-R approaches and be doin' em inside.

13:54:27.7
HOT [throughout the recording, the sound of a high pitch tone (2,800 Hz), similar to the trim in motion, was observed multiple times but not specifically documented for the first part of the recording. After 14:14:00 CDT, all occurrences of sounds similar to the trim in motion were documented.]

13:54:38.4
HOT-1 we don't have to get some blinders on yah.

13:54:41.7
HOT-1 glideslope captain.

13:54:43.5
HOT-2 I'm gettin' there.

13:54:48.1
HOT-1 glide slope.

13:54:48.6
HOT-2 gear down.

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

13:54:50.0
CAM [sound of thunk and increased noise, similar to gear extension]

13:55:08.9
CAM [sound of 5 rapid tones, similar to altitude alert]

13:55:21.8
HOT-1 you got a pillow back there?

13:55:23.8
HOT-3 no.

13:55:23.9
EGPWS one thousand.

13:55:51.0
HOT-1 glideslope. localizer.

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

13:55:40.2
APR * three bravo golf contact tower one two seven point six.

13:55:42.7
RDO-1 twenty seven six. roger.

13:55:47.5
RDO-1 and seven nine three bravo golf with you for the option.

13:55:59.4
TWR * seven nine three bravo golf Huntsville Tower runway one eight right cleared for the option.

13:56:02.7
RDO-1 roger. bravo golf.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

13:56:10.1
HOT-1 two hundred feet to minimums.

13:56:14.7
HOT-1 glideslope. glideslope. glideslope.

13:56:21.8
HOT-1 alright. missed approach.

13:56:23.6
EGPWS too low flaps.

13:56:25.0
HOT-1 missed approach.

13:56:27.0
EGPWS minimums.

13:56:28.5
HOT-2 positive rate. gear up.

13:56:30.0
HOT-1 not yet.

13:56:31.0
HOT-1 nowww. positive rate now.

13:56:32.5
CAM [sound of thunk, similar to gear retraction]

13:56:33.0
HOT-1 gear's comin' up.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

13:56:35.5

HOT-1 climb to thirteen hundred.

13:56:37.9

CAM [sound of thunk, similar to completion of gear retraction]

13:56:49.1

HOT-1 four hundred feet.

13:56:50.4

HOT-2 flaps up.

13:57:02.7

HOT-1 yeah and we'll give ya'.

13:57:03.2

HOT-2 right turn to the V-O-R.

13:57:04.7

HOT-1 yeah. thirteen hundred feet. right turn direct.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

13:57:06.3

TWR three bravo golf contact departure.

13:57:08.9

RDO-1 roger.

13:57:20.0

RDO-1 and ah seven nine three bravo golf is back with you.

13:57:23.4

TWR ah contact departure.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

13:57:23.9
HOT [sound of intermittent high pitch tone of varying intensity, similar to trim in motion]

13:57:29.3
HOT-1 direct to the V-O-R.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

13:57:24.9
RDO-1 up. sorry.

13:57:47.1
RDO-1 and seven nine three bravo golf is ah back with you.

13:57:52.0
APR november seven niner three bravo golf. Huntsville Departure. radar contact and maintain V-F-R at or above three thousand five hundred.

13:57:59.8
RDO-1 thirty five hundred roger. and we're doing the published miss correct?

13:58:03.2
APR and three bravo golf affirmative. just at or above three thousand five hundred please.

13:58:06.7
RDO-1 roger. we'll do that.

13:58:09.4
APR nine three bravo golf roger verify leaving three thousand now.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

13:58:54.6
HOT-1 the outbound is two seventy four on this hold.

13:58:59.9
HOT-2 alright.

13:59:01.8
HOT-2 zero nine four inbound.

13:59:03.4
HOT-1 ahh?

13:59:03.9
HOT-2 zero nine four inbound?

13:59:05.4
HOT-1 yeah.

13:59:05.9
HOT-2 yeah.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

13:58:12.4
RDO-1 ah we're out of thirty two now.

13:58:14.3
APR roger.

13:59:08.7
APR * three bravo golf there is traffic about three miles west of your position direct to the Decatur V-O-R Cessna one seventy two three thousand.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

13:59:21.1
HOT-1 what's your hold speed?

13:59:24.7
HOT-2 one eighty.

13:59:33.5
HOT-1 you're flyin' on your pointer there. (just) go direct to the V-O-R.

13:59:42.7
HOT-2 over the V-O-R.

13:59:45.4
HOT-1 huh?

13:59:45.9
HOT-2 we're over the V-O-R.

13:59:46.7
HOT-1 yeah.

13:59:47.2
HOT-1 yeah. two thirty five on the heading...

13:59:49.9
HOT-1 ...for the teardrop.

14:00:34.6
HOT-1 okay you got your time?

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

13:59:15.4
RDO-1 roger. we're holdin' thirty five hundred.

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

14:00:36.9
HOT-2 yep.

14:00:38.5
HOT-1 back in.

14:01:29.4
HOT-1 ah she's startin' to come inbound.

14:02:07.3
HOT-1 *.

14:02:57.4
TCAS traffic. traffic.

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

14:00:45.4
RDO-1 nine three bravo golf's entering the hold.

14:00:48.9
APR nine three bravo golf roger.

14:01:47.4
APR Huntsville Airport A-TIS information Juliet now current. wind two four zero at four. altimeter three zero one zero.

14:02:45.0
RDO-1 and seven nine three bravo golf we'd like to uh get a vectors for another I-L-S when we get to the V-O-R.

14:02:54.6
APR Westwind three bravo golf roger depart Decatur V-O-R heading * vectors to the I-L-S runway one eight right approach Huntsville.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:03:03.0
HOT-1 five hundred feet below us on your left.

14:03:05.1
HOT-2 alright.

14:03:06.5
HOT-1 what a heading was it?

14:03:07.8
HOT-2 three five zero I think is what she said.

14:03:09.0
HOT-1 (yeah that's it).

14:03:18.4
HOT-1 okay.

14:03:42.6
HOT-1 altitude.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:03:02.1
RDO-1 roger.

14:03:11.0
RDO-1 that was three five zero heading out of the V-O-R?

14:03:13.9
APR no. three bravo golf fly heading three six zero. three sixty.

14:03:16.6
RDO-1 three sixty roger.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:03:53.2
HOT-2 [clears throat]

14:04:54.4
HOT-2 [clears throat]

14:04:58.4
HOT-2 alright. one oh nine three. one eighty four inbound.

14:05:01.8
HOT-1 yep.

14:05:03.0
HOT-1 one eighty four inbound. one oh nine three.

14:05:10.3
HOT-1 did it kick off on yah?

14:05:12.3
HOT-2 it's. it's off. I don't know what's wrong with it.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:04:05.9
APR and three bravo whiskey correction three bravo golf how will this approach terminate?

14:04:09.7
RDO-1 ah bravo golf we'd like to do a full stop taxi back and switch pilots.

14:04:16.1
APR * three bravo golf roger.

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

14:05:25.0
HOT-1 okay. you got heading and altitude hold.

14:06:28.9
HOT [sound of 5 high-pitch tones, similar to altitude alert]

14:07:01.6
EGPWS twenty five hundred.

14:08:33.8
HOT-2 flaps twelve.

14:08:35.9
HOT [sound of click]

14:08:38.5
HOT-1 that a federal prison there?

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

14:06:17.4
APR three bravo golf turn right heading zero niner zero. maintain V-F-R at or above three thousand.

14:06:22.6
RDO-1 zero nine zero at or above three thousand. bravo golf roger.

14:07:58.0
APR * three bravo golf. six miles from *. turn right heading one five zero. maintain three thousand till established on the localizer. cleared I-L-S runway one eight right approach.

14:08:05.6
RDO-1 one five zero cleared for the approach ah bravo golf *.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:08:41.1
HOT-2 flaps twenty. got a what?

14:08:43.4
HOT [sound of click]

14:08:44.1
HOT-1 said is that a federal prison?

14:08:46.0
HOT-2 ah yeah. I believe it is.

14:09:20.6
HOT-2 gear down.

14:09:23.0
CAM [sound of thunk and increased noise, similar to gear extension]

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:09:27.5
APR november three bravo golf contact tower one two seven point six.

14:09:30.9
RDO-1 twenty seven six roger.

14:09:34.8
RDO-1 ah tower seven nine three bravo golf is with you we'd like to do a full stop and taxi back.

14:09:39.6
TWR november seven niner three bravo golf Huntsville tower roger. runway one eight right. wind two six zero at seven. cleared to land.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:09:49.2

HOT-1 kay. one twenty--

14:09:49.5

HOT-2 landing flaps.

14:09:50.6

HOT-1 one twenty five. flaps full you say?

14:09:52.9

HOT-2 yeah.

14:09:53.2

HOT-1 [sound of click]. flaps land.

14:10:05.9

HOT-1 about one twenty five is going to be a good ref.

14:10:08.4

HOT-2 alright.

14:10:17.2

HOT-1 checklist. three greens. flaps full. checklist is completed.

14:10:17.2

HOT [sound of 5 high-pitch tones, similar to altitude alert]

14:10:36.8

HOT-1 one twenty five is final ref captain. you're ref minus five.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:09:46.9

RDO-1 bravo golf. roger.

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

14:10:42.3

HOT-2 I'm showin' dead on it here.

14:10:43.4

HOT-1 okay. well it's five knots difference between the two then.

14:11:03.7

HOT-1 yeah. that's what it is. because I'm showin' five knots slower than that one.

14:11:08.1

HOT-2 alright.

14:11:29.5

HOT-1 [humming a musical tune]

14:11:33.4

HOT-1 thousand feet to minimums.

14:11:57.4

EGPWS one thousand.

14:12:19.6

HOT-1 five hundred feet to minimums.

14:12:29.5

HOT-1 four hundred.

14:12:38.5

HOT-1 three hundred.

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

14:12:41.1

TWR wind two six zero at eight.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:12:45.0
HOT-1 a little crosswind from the right when you get down there. two hundred.

14:12:53.6
HOT-1 runway's in sight captain. full flaps. gear down. checklist completed.

14:12:58.5
HOT-2 alright.

14:12:59.2
CAM [sound of click]

14:12:59.6
HOT-1 right crosswind about eight knots off your right.

14:13:07.8
HOT-? [sound of clearing throat]

14:13:10.8
EGPWS minimums

14:13:20.0
EGPWS fifty. forty. thirty. twenty.

14:13:23.3
HOT-1 catch it.

14:13:23.6
EGPWS ten.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:13:24.8

HOT-1 hold it off. hold it off.

14:13:26.0

HOT [sound of click]

14:13:26.2

HOT-1 hold it off. don't get in no hurry to put it on the ground.

14:13:29.2

HOT-1 close that throttle. there you go.

14:13:30.7

HOT [sound of multiple clicks]

14:13:33.4

CAM [sound of muffled thunk]

14:13:36.7

CAM [sound of thunk, similar to nosewheel touchdown]

14:13:37.1

HOT [sound of increased noise, similar to thrust reversers]

14:13:39.1

HOT-1 beautiful. my yoke.

14:13:41.8

HOT-1 you should be on the brakes to control that direction. not your nosewheel steering...

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

14:13:44.3
HOT [sound of decreasing noise, similar to speed decrease and reduction in engine power]

14:13:46.0
HOT-1 ...brakes should be controllin' it...

14:13:49.0
HOT-1 ...nosewheel steering is to clear the runway.

14:13:53.8
HOT-1 you still need a little brakes here to control your direction.

14:13:57.2
HOT-1 you're just. floatin' back and forth...

14:14:00.2
HOT-1 there you go.

14:14:03.6
HOT-1 you gonna make this one?

14:14:04.7
HOT-2 yep.

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

14:13:58.8
TWR november three bravo golf turn left next taxiway. contact ground point niner. (goodday).

14:14:05.6
RDO-1 roger.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:14:07.5
CAM [sound of decreased background noise, similar to aircraft decelerating on the ground]

14:14:15.6
HOT [sound of 2 click-clacks, similar to stowing thrust reverser levers]

14:14:25.2
HOT [exhale] [sound of click]

14:14:26.9
HOT-1 [straining] ugh. go ahead and put that back up there.

14:14:28.7
HOT-? (yeah).

14:14:31.5
HOT [sound of three clicks, similar to mic keying]

14:14:32.1
HOT-2 I got no brakes. *.

14:14:33.4
HOT-1 huh?

14:14:34.3
HOT-2 I got no brakes here.

14:14:35.3
HOT-1 [sound of three clicks, similar to mic keying]

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

14:14:35.8
HOT [sound of clunk, similar to pushing the parking brake handle]

14:14:35.8
HOT-1 no brakes at all. there you go.

14:14:37.0
HOT [sound of rattle]

14:14:39.6
HOT-1 what the hell we doin' with that in there?

14:14:42.1
HOT-2 I don't know.

14:14:42.9
HOT-1 how did that get pulled?

14:14:47.8
HOT-2 you alright?

14:14:49.9
HOT-? [clearing throat]

14:14:51.2
HOT-1 twenty one nine. [low volume]

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

14:15:06.7
RDO-1 and ah seven nine three bravo golf cleared goin' back for another [stammer] round.

14:15:09.9
CAM [sound of 4 clicks]

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:15:30.4
HOT-1 alright.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:15:12.8
GND november seven niner three bravo golf. huntsville ground. taxi to the ramp via whiskey kilo juliet foxtrot.

14:15:18.4
RDO-1 roger. we'd like to stop on the taxiway here for a little bit and change pilots.

14:15:25.8
GND november three bravo golf roger ah. you can hold on whiskey north of juliet. and are you goin' back to the runway?

14:15:34.8
RDO-1 yeah. affirmative. goin' to the back to the runway. if we can just stop right here be gotta out of everybody's way it'll be fine.

14:15:41.3
GND november three bravo golf if you can taxi up past the the kilo and whiskey intersection (i have an ops) vehicle trying to get to the ramp.

14:15:48.7
RDO-1 roger. we'll just do that.

14:15:51.8
GND thank you.

14:15:53.0
RDO-1 ah. up north of ahhh whiskey three lima?

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:16:05.3
HOT-1 forty-five degree taxiway past that is where they want you to stop at.

14:16:11.8
HOT [sound of high pitch tone (2.3 seconds), similar to trim in motion]

14:16:15.3
HOT [sound of high pitch tone (0.4 seconds), similar to trim in motion]

14:16:16.0
HOT [sound of high pitch tone (0.6 seconds), similar to trim in motion]

14:16:19.2
HOT [sound of high pitch tone (0.5 seconds), similar to trim in motion]

14:16:23.1
CAM [sound of click]

14:16:27.5
HOT [sound of multiple clicks]

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:15:58.5
GND just a little bit further past that. past ah kilo via juliet.

14:16:02.3
RDO-1 oh okay. I've got it. thanks.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:16:30.7
CAM [sound of low volume whining for about 6.2 seconds, (similar to a low impulse electric motor)]

14:16:31.9
HOT-? [exhale]

14:16:56.4
HOT-? [clears throat]

14:16:59.3
HOT-2 I was agreeing with everything you said. but the brakes weren't doing anything.

14:17:02.5
HOT-1 [laughter] I don't know how in the hell that we--

14:17:06.7
HOT-2 I don't know when we pulled that out.

14:17:08.4
HOT-1 I...I don't remember pullin' it out.

14:17:12.0
HOT-1 was it all the way out? or just a little way?

14:17:13.9
HOT-2 it was all the way.

14:17:14.8
HOT-1 was it?

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:17:18.1
HOT-?

huh.

14:17:19.9
HOT-1

well. the only thing I can figure is that we put taxied up to the end of the runway back there--

14:17:24.7
HOT-2

when we turned the anti-skid on it turned it loose.

14:17:26.6
HOT-1

that's correct...

14:17:27.3
HOT-2

yeah.

14:17:27.4
HOT-1

...when you taxied up and parked. we got ready to go and you threw that anti-skid on (it) turned it loose.

14:17:31.6
HOT-2

yep.

14:17:35.0
HOT-2

never had that happen before.

14:17:37.1
HOT-1

well. it's just ah. okay we can stop right up here. just. just go ahead and come to a stop right here. if you want to.

14:17:47.2
HOT-1

that's good.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:17:53.9

HOT-1 go ahead and turn that off.

14:17:55.4

HOT-2 it's off.

14:17:56.0

HOT-1 you got it off. okay.

14:17:57.1

CAM [sound of knocking and rustling]

14:17:57.7

HOT-1 let. @[other pilot] up here and.

14:18:01.5

HOT-1 let him...

14:18:02.2

HOT-? whooaa.

14:18:02.5

HOT-1 ...starting bangin' it around a little bit.

14:18:03.3

CAM [sound of clicks]

14:18:05.1

HOT-2 ready?

14:18:05.8

HOT-3 *.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:18:06.7

HOT [sound of rustling]

14:18:13.2

CAM [sound of rustling]

14:18:17.6

HOT [sound of click, similar to seatbelt]

14:18:26.4

HOT-1 [exhale]

14:18:32.6

HOT [sound of click, similar to seatbelt]

14:18:39.3

CAM [sound of two clicks]

14:18:52.7

CAM [sound of click]

14:19:03.0

HOT [sound of click, similar to seatbelt]

14:19:05.3

HOT [sound of rustling]

14:19:09.3

HOT-3 ahhhhh kay.

14:19:12.9

CAM [sound of snap]

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:19:16.0

HOT-1 okay. call it one-twenty. ah one-eighteen one-twenty-one. and ah one-seventy-five[†].

14:19:24.1

HOT-3 all...alright [stammering].

14:19:24.6

HOT-1 one-eighteen.

14:19:26.5

HOT-1 one-twenty-one on your side.

14:19:29.6

HOT-1 v-two is one-twenty-one.

14:19:35.9

HOT-1 yep. v. one-eighteen. one-twenty-one. and one-seven--. I'll put one--

14:19:40.8

HOT-1 ah. I'll put one-eighteen over here.

14:19:44.0

HOT-1 since there is a little bit of a discrepancy in that. okay let's go ahead and taxi on down to the--

14:19:45.6

HOT-3 mmhmm.

[†] Due to the many numbers spoken over the next few minutes, dashes are used between numbers for clarity.

TIME and SOURCE

INTRA-AIRCRAFT CONTENT

14:19:49.4
HOT-3 [breathing, rustling]

14:19:55.1
HOT-3 we're cleared to taxi I guess?

14:19:56.2
HOT [sound of click]

14:19:56.6
HOT-1 yeah.

14:20:09.5
HOT-3 ohhhkay. (roger).

14:20:19.2
HOT-1 before takeoff check. I got it right here.

14:20:25.9
HOT-1 [unintelligible mumbling]

14:20:28.4
HOT-1 airspeeds are bugged. lift dumps are off.

TIME and SOURCE

AIR-GROUND COMMUNICATION CONTENT

14:19:58.1
RDO-1 and ah bravo golf we're taxiing now.

14:20:02.4
GND three bravo golf roger. contact tower when ready.

14:20:05.8
RDO-1 roger.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:20:32.5

HOT-1 reversers are on.

14:20:34.8

HOT-1 and [unintelligible mumbling].

14:20:38.5

HOT-1 annunciator panel clear. engine anti-ice and windshield heat [sound of 2 clicks] is on.

14:20:43.1

HOT-1 (battery). [sound of click] press.

14:20:44.9

HOT-1 heat.

14:20:45.9

HOT-1 crew briefin'.

14:20:47.1

HOT-1 line up check.

14:20:48.7

HOT-1 we got the. the ignition. pitot heat's on. ignition's on. and ah...

14:20:54.4

HOT-1 and the ah. [sound of click] the reversers will be armed.

14:20:59.9

HOT-1 and. [cough]. we'll be ready at the end when you are captain.

14:21:02.9

HOT-3 okay.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:21:05.8

HOT-1 at your. at your request.

14:21:08.1

HOT-3 [sigh/clearing throat]

14:21:14.3

HOT-1 we'll be ah. be ah. ah vector. you wanna. you wanna do the ah.
you wanna do the two I-L-Ss to start with or you wanna go out
and do airwork first?

14:21:18.9

CAM [sound of about 7 clunks]

14:21:26.7

HOT-3 oh whatever you think. ah.

14:21:28.4

HOT-1 well if you're comfortable. let's just go out and get vectored for a
couple I-L-Ss.

14:21:32.1

HOT-3 okay. that'll be fine.

14:21:32.6

HOT-1 alright.

14:21:42.7

HOT-3 I'm trying to get this thing. I can't get my...

14:21:48.2

HOT-1 yeah. pull up here and stop. we'll get it all together when you
get around this corner.

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:22:00.4
HOT-3 how do I get my heading bug (over). oh there it is.

14:22:12.3
HOT-3 well okay. we've got flaps and.

14:22:16.2
HOT-1 checklist is completed. except for the ignition and the arming of
reversers.

14:22:24.2
HOT-1 so whenever you're ready let me know.

14:22:26.4
HOT-3 okay. we're ready for takeoff I guess.

14:22:29.0
HOT-1 alright.

14:22:31.2
HOT [sound of click, similar to mic keying]

14:22:32.2
HOT-1 pull up here and stop.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:22:33.8
RDO-1 nine seven three bravo golf is ready to go and we'd like to
have a couple of more I-L-Ss (if) before we depart the area.

14:22:46.8
TWR november three bravo golf roger. standby. you say you want
I-L-Ss?

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

14:23:11.7
CAM [sound of multiple clicks over next 7 seconds]

14:23:12.4
HOT-1 alright captain.

14:23:26.9
HOT-3 cleared for takeoff. *.

14:23:30.0
CAM [silence due to CVR tape splice (.3 seconds)]

14:23:30.3
HOT-3 ehhh.

14:23:32.8
HOT-3 * lights coming on.

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:22:51.2
RDO-1 yeah. we want two I-L-Ss and then we'll depart back towards
uhm Birmingham.

14:23:00.8
TWR november seven niner three bravo golf. Huntsville Tower.
runway one eight right. wind two eight zero at five. cleared for
takeoff.

14:23:05.9
RDO-1 ah roger. runway heading and cleared for takeoff.

14:23:10.6
TWR [Huntsville Tower clears Blue Streak 4774 to land on 18R and
follow-on clarifications of call sign for next 37 seconds]

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:23:33.7

CAM [sound of 2 clicks]

14:23:47.3

CAM [sound of increased noise, similar to power increase]

14:23:49.5

CAM [sound of multiple thumps, similar to nosewheel travelling over centerline lighting]

14:23:51.8

HOT-1 airspeed's alive.

14:23:53.1

HOT-3 (split) power.

14:23:55.3

HOT-1 power's set.

14:23:56.1

HOT-3 [pronounced exhales 8 times in 13.7 seconds]

14:23:57.2

HOT-1 eighty knots.

14:24:04.9

HOT-1 v-one. rotate.

14:24:05.5

HOT [sound of click]

14:24:07.5

CAM [sound of thunk]

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:24:10.0

HOT [sound of click]

14:24:10.9

HOT-3 gear up.

14:24:11.4

HOT [sound of click-clack]

14:24:11.8

HOT [sound of rattling begins and continues until end of recording]

14:24:12.7

CAM [sound of decreasing whine (from about 2,000 Hz to below 900 Hz) over about 3.7 seconds]

14:24:13.3

HOT-1 # what happened.

14:24:15.7

CAM [background noise increases to a peak in about 1.5 seconds]

14:24:15.7

HOT-3 [moaning] ohh-hh.

14:24:17.2

CAM [background noise decreases slightly]

14:24:17.7

HOT-3 what'd you do. what happened (to us).

14:24:19.3

HOT-1 I don't know [strained voice].

**TIME and
SOURCE**

INTRA-AIRCRAFT CONTENT

**TIME and
SOURCE**

AIR-GROUND COMMUNICATION CONTENT

14:24:20.2

HOT-1 get the gear up [strained voice].

14:24:20.9

HOT-3 [exhaling characterized by vibrato-type pulsating; about 3 peaks in 0.7 seconds]

14:24:23.5

HOT-1 we're goin' in. we're goin in.

14:24:24.5

EGPWS bank angle. bank angle. [note: not observed on CAM only on HOT channels]

14:24:25.5

CAM [background noise increases until end of recording]

14:24:26.1

HOT-3 uhh [high pitched].

14:24:26.9

EGPWS bank angle. bank angle. [note: not observed on CAM only on HOT channels]

14:24:27.5

HOT-3 whff [high pitched].

14:24:28.3

CAM [sound of thunk, similar to impact].

END OF TRANSCRIPT

END OF RECORDING

14:24:28.6 CDT