

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



GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

DCA11IA015

**By
Bill Tuccio**

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

March 31, 2011

Cockpit Voice Recorder - 12

Group Chairman's Factual Report

By Bill Tuccio

A. EVENT

Location: Jackson Hole, Wyoming
Date: December 29, 2010, 11:30 Mountain Standard Time (MST)
Aircraft: Boeing-757-200, N668AA
Operator: American Airlines, Flight 2253
NTSB Number: DCA11IA015

B. GROUP A group was convened on January 4, 2011*.

Chairman: Bill Tuccio
National Transportation Safety Board

Member: Bob Hendrickson
Air Safety Investigator
Federal Aviation Administration

Member: Thomas Lange
Captain, Senior Safety Pilot
The Boeing Company

Member: Chuck Harman
Captain
Allied Pilots Association (APA)

C. SUMMARY

On December 29, 2010, at approximately 11:38 mountain standard time (MST), American Airlines flight 2253, a Boeing 757-200, registration N668AA, overran runway 19 upon landing at Jackson Hole Airport (KJAC), Jackson Hole, Wyoming. Preliminary reports indicate that the airplane came to rest approximately 350 feet past the runway overrun area. There were no injuries to the 179 passengers and 6 crew on board, and preliminary reports indicate that the airplane was undamaged. Passengers were

* American Airlines was not a group member as their party status was revoked January 1, 2011.

deplaned using airstairs, and the airplane was towed to the ramp and secured for further examination. A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board's Audio Laboratory for readout. The CVR group meeting convened on January 4, 2011 and a partial transcript was prepared for a 2 minute 3 second portion of the recording 46 minutes 22 seconds before the end of the recording. Additionally, a transcript was prepared for the final 31 minutes 3 seconds of the 2-hour 4 minute 31 second digital recording (see attached).

D. DETAILS OF INVESTIGATION

On December 30, 2010, the NTSB Vehicle Recorder Division's Audio Laboratory received the following CVR:

Recorder Manufacturer/Model: **L-3 Communications FA2100-1020**
Recorder Serial Number: **107348**

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 L-3 Communications FA2100-1020, is a solid-state CVR that records 2 hours of digital cockpit audio. Specifically, it contains a 2-channel recording of the last 2 hours of operation and separately contains a 4-channel recording of the last 30 minutes of operation. The 2-hour portion of the recording is comprised of one channel of audio information from the cockpit area microphone (CAM) and one channel that combines 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 observer; and one channel for the CAM 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

For the 2-hour portion of the CVR recording, each channel contained good quality[†] audio information. As shown in the table below, the 30-minute portion of the recording consisted of three channels of useable audio information. Each channel's audio quality is indicated in the table.

| Channel Number | Content/Source | Quality |
|-----------------------|-----------------------|----------------|
| 1 | Captain | excellent |
| 2 | First Officer | excellent |

[†] See attached CVR Quality Rating Scale.

| Channel Number | Content/Source | Quality |
|----------------|----------------|-----------|
| 3 | Other | excellent |
| 4 | CAM | good |

Timing and Correlation

Timing on the transcript was established by correlating the CVR events to common events on the flight data recorder (FDR). Specifically, five radio transmissions that the aircraft made on the 30 minute recording were correlated to the radio transmit microphone key parameter from the FDR (CVR 24:50.649, 21:29.148, 21:22.155, 20:08.655, and 19:59.798). Each of the five radio transmissions acted as an anchor point for a linear interpolation between the remaining CVR events. It was determined that FDR Subframe Reference Number (SRN) 157,772 aligned to 30 minute CVR elapsed time 19:59.798. The FDR SRN of 157,772 corresponded to FDR UTC time of 18:33:23 or 11:33:23 MST. This correlation resulted in adding 11:13:23.202 to the 30 minute CVR recording elapsed time and adding 9:40:19.995 to the 2 hour CVR recording elapsed time to convert to MST.

Description of Audio Events

The recording began at 9:40:20, with the aircraft in cruise at flight level 380. The first officer was the flying pilot and the captain the non-flying pilot. Crew conversations and radio traffic indicated turbulence conditions of continuous light chop. When the recording began, the crew was mid-discussion about landing distance performance of the Boeing 757 aircraft. Included in the discussion were comments about the Vail, Colorado airport and how landing distance is affected by aircraft weight, braking action and thrust reversers. The captain noted in passing his surprise that thrust reversers were not required by the MEL[‡] at the Jackson Hole airport.

At 10:48:51, the first officer advised the captain of MU[§] values received for Jackson Hole of 45, 54, and 32. The captain acknowledged the MU values and noted the importance of stopping the airplane early in the landing role.

After unsuccessful attempts to get the ATIS at Jackson Hole, an approach briefing was conducted. The approach briefing is captured in the attached transcript.

Following the approach briefing, at 11:03:42, the captain confirmed with Salt Lake center there would be no delays or holding going into Jackson Hole. Thereafter, the captain received ATIS information Victor at Jackson Hole recorded at 17:45 UTC. The ATIS indicated sky conditions of 400 foot broken and 1,000 foot overcast clouds, 3/4 mile visibility in light snow, winds from 230 degrees at 10 knots, temperature -4 Celsius, dewpoint -7 Celsius, 29.16 on the altimeter, and MU values of 45, 54, 32 measured at 17:10 UTC by a SAAB friction tester. The runway condition was reported as thin loose snow over patchy thin snow and ice. A previously landing aircraft, a Challenger 30, reported braking action in the first 2/3rds of the runway as good and poor in the last

[‡] MEL means minimum equipment list. An MEL allows aircraft to operate with certain equipment inoperative, often with additional limitations placed on aircraft operations.

[§] The Aeronautical Information Manual (AIM) defines MU (pronounced “myew”) as “used to designate a friction value representing runway surface conditions” (2010, section 4-3-9). The AIM and other FAA Advisory circulars provide guidance for interpretation of MU values.

1/3rd. A departing Pilatus reported bases as 6,900 feet, trace rime ice from 13,000 to 15,000 and negative turbulence in the climb.

Upon receipt of the ATIS, the captain briefed the first officer on the ATIS and field conditions, highlighting the braking action and his concern about the last 1/3rd of the runway. The remainder of the flight is covered by the attached transcript.

The recording ended at 11:44:27 as the crew pulled the CVR circuit breaker.

As part of the Safety Board's accident investigation process, the flight crew was invited to review the CVR transcript and suggest corrections or additions. The first officer declined the invitation. The captain accepted the invitation and reviewed part of the transcript on March 14, 2011.

The captain's only addition was that when the transcript identifies, "[sound of multiple mechanical clicks and thumps]" at 11:37:44.8, the captain believed one of the clicks recorded was the sound of spoiler handle automatic actuation.

Bill Tuccio
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 L-3 Communications FA2100-1020 solid-state cockpit voice recorder, serial number 107348, installed on an American Airlines Boeing-757-200 (N668AA), which overran the runway at Jackson Hole Airport (JAC) in Jackson Hole, Wyoming.

LEGEND

| | |
|--------------|---|
| CAM | Cockpit area microphone voice or sound source |
| HOT | Flight crew audio panel voice or sound source |
| RDO | Radio transmissions from N668AA |
| CTR | Radio transmission from Salt Lake center controller |
| ATIS | Radio transmission from Jackson Hole Automatic Terminal Information Service |
| OPS | Radio transmission from the Jackson Hole American Airlines operations |
| PA | Public address system in aircraft |
| TWR | Radio transmission from the Jackson Hole airport tower controller |
| EGPWS | Enhanced Ground Proximity Warning System |
| AC | Delta flight 1331 |
| SAAB | SAAB friction tester vehicle |
| ARFF | Airport rescue and firefighters |
| CRASH | Airport crash and rescue |
| -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 mountain standard time (MST).

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 COMMUNICATION
CONTENT

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

09:40:20.0
START OF RECORDING

10:58:29.7
START OF TRANSCRIPT (APPROACH BRIEFING PORTION)

10:58:29.7
CAM-1 are you comfortable with the approach you want to go over it?

10:58:32.5
CAM-2 ah yeh basically just like what we've been doing all month one oh nine one one eighty seven inbound we need three quarters of a mile sixty six fifty one is the M-D-A six fifty one.

10:58:46.1
CAM-1 ah six fifty one I was doin' I was doin' the outbound I have the seventy four fifty for the outbound.

10:58:51.5
CAM-2 yep.

10:58:51.9
CAM *.

10:58:52.4
CAM-2 uh if we * if we miss and we're prior to that two point eight D-M-E we'll do the left hand turn back around we'll probably hafta' do the whole thing back around.

10:59:01.9
CAM-1 yeah * have to go up to DUNOIR.

10:59:03.7
CAM-2 right.

10:59:04.0
CAM-1 if we're burnin' if were burnin' we'll turn right around and come in if we're have a other maintenance issues if not we're on fire let's go to Salt Lake you know what I mean with this weather.

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

10:59:04.1

CAM-2 and the weather is.

10:59:12.8

CAM-2 okay.

10:59:14.0

CAM-2 yep.

10:59:14.9

CAM-2 um missed is in the box be straight out there to KICNE at * there is terrain we know about that I'll get slowed down for the turn comin' out of DUNOIR and we will * if we come in below five hundred feet or so and uh and maybe a little bit earlier I'll be droppin' down to about a half a dot maybe a little more and touchdown in the first five hundred feet.

10:59:36.2

CAM-1 kind'a like what I did yesterday and I just closed the throttle and went for it because uh * 'cause this thing'll float you know.

10:59:37.3

CAM-2 yeah.

10:59:39.8

CAM-2 right.

10:59:42.2

CAM-2 correct.

10:59:44.2

CAM-2 speed 'ill be on and everything so I'll make sure all that.

10:59:48.2

CAM *.

10:59:49.2

CAM-2 if you * don't like what you see tell me to go around.

10:59:52.2

CAM-1 okay one thirty one on the numbers.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

10:59:55.2

CAM-2 one thirty one that works for me...left hand turn off...max brakes yeah.

11:00:02.6

CAM-1 * be slippery slippery max auto it'll be slippery at the end there.

11:00:04.7

CAM-2 yeah.

11:00:06.3

CAM-2 right once we get down you know we're slowin' down I'll whenever you either want it or I'll hand it over to ya'.

11:00:13.3

CAM-1 yeah * probably I'll get it just 'cause wanna make sure I'm comfortable with the steering in the turn before I get to the turn...cause it's got that ninety degree turn.

11:00:13.8

CAM-2 *.

11:00:19.5

CAM-2 right okay.

11:00:23.9

CAM-2 right.

11:00:26.6

CAM-2 with those M-U's I almost stop before I turn.

11:00:30.1

CAM-1 yeah well that's it.

END OF TRANSCRIPT (APPROACH BRIEFING PORTION)

11:00:30.1

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

11:13:23.2

START OF TRANSCRIPT (LAST PORTION OF FLIGHT)

11:13:37.8

HOT-1 ...at seventeen ten the guy landed after that called it good first two thirds poor the last one third but he was a uh Challenger thirty so little light guy.

11:13:37.9

CTR ...thirty two Salt Lake center roger other aircraft say again.

11:13:42.0

PA-3 ladies and gentlemen we are very shortly beginning our descent if you would make sure your seat belts is securely fastened once again thank you.

11:13:48.2

HOT-2 skip we'll get her slowed down no matter what.

11:13:50.0

HOT-1 yeh um (ramp's a) light snow base is sixty nine hundred foot no ice in the arrival or turbulence.

11:14:00.5

CAM-1 s'that last one third I'm worried about.

11:14:02.5

CAM-2 okay.

11:14:03.6

CAM-1 but it's a light airplane.

11:14:05.0

CAM-2 right.

11:14:07.7

HOT-1 alright I'm off just a minute.

11:14:08.7

HOT-2 okay.

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

11:14:13.8

PA-1 well as you can tell we've started our descent into Jackson Hole. there are a few breaks in the clouds uh not sure all what we're going to see but ah give you an idea cause ah if the clouds do break a little bit its so spectacularly beautiful here uh (id would) be kind'a nice to know what we're gonna look at. we arrive in Jackson Hole from the Northeast ah through ah the (Togwotee Pass). ah if your lookin' off the left hand side uh out there through the clouds you can see the Wind River Range that works its way to the Northwest. we're gonna come up over the ah the south end of the (af sirc) range and the valley between them is the (Togwotee Pass) route twenty six. if you've ever driven that and that's ah the route we kind'a take into the ah valley as we fly due west. once we get in (to) the center of the valley we make a left hand turn start our descent to the south land to the south at the ah Jackson ah Hole airport. as you make that ah left turn to the south ah Jackson Lake will ah be close in on the right hand side it still has a little bit of open water and last we looked at it. and (then) of course the Tetons will be off our right. the highest one will be Grand Teton. Teton Villages will be a little bit south of the airport you won't be able to see them on landing if you're on the ah left hand side. as we enter the valley ah as we make that turn you'll have a nice view of the Snake River it'll be following us all the way. ah as we make the approach into the airport the ah the (Gros Ventre) Range is ah off to the left hand side. and ah on short final ah very close in it looks like it's right off the left wing tip you'll see Black Tail Butte if there is a break in the clouds an ah we didn't see it yesterday we saw it a couple days ago ah off the right as we ah just as we make the turn to the South we can look way off the right wing ah about thirty miles up we often get a nice view of ah Yellowstone Lake. we should be on the ground in Jackson Hole in ah about twenty minutes maybe just a little bit more than that.

11:16:07.3

HOT-1 thank you sir.

11:16:08.2

HOT-2 ah you're welcome.

11:16:21.0

HOT-2 [sound of person humming]

11:16:26.8

HOT-2 there goes the traffic we were up-

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:16:28.5
HOT-1 yep.

11:16:29.0
HOT-2 -above.

11:16:32.5
HOT-1 I'm back to yah.

11:17:17.8
HOT-2 two nine one five? holy #.

11:17:21.8
HOT-1 yep two nine one six on theirs.

11:17:22.4
HOT-2 wow.

11:17:24.3
HOT-2 sixteen thousand set.

11:17:43.1
PA-1 and now as we descend into the clouds here at Jackson a fairly strong wind about ah eighty miles an hour across the (Absircs) here could give us a little bump or two so at this time I would like to ask our flight attendants to complete their duties take their seats and remain seated for the rest of the flight thank you.

11:17:59.7
CAM-1 one six is what they give us.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:17:03.1
CTR American twenty two fifty three descend and maintain one six thousand Jackson altimeter two niner one five.

11:17:11.3
RDO-1 descend to one six thousand altimeter two niner one five American ah twenty two fifty three.

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

11:18:00.6

PA-3 in final preparation for our landing please adjust your seat back to the upright position and stow your tray table if you have taken carry on luggage out during the flight it does need to be once again beneath the seat in front of you please turn off and put away all electronic devices flight attendants will be collecting remaining service items we'll be landing soon.

11:18:01.8

HOT-2 sixteen alright that's way down there two niner one six.

11:18:06.0

CAM-1 this has two nine one six yeah.

11:18:07.9

HOT-2 alright that works for me.

11:18:10.5

CAM-1 that's low.

11:18:11.6

HOT-2 it is.

11:18:22.5

HOT-1 did the airplane perform ok?

11:18:24.3

HOT-1 cruise checklist complete.

11:18:25.8

HOT-2 yeah it did.

11:18:26.2

HOT-1 we didn't divert did we?

11:18:27.3

HOT-2 no not yet.

11:18:28.0

HOT-1 alright.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:18:36.8
HOT-1 uh-oh last time crew coordination last one for the year.

11:18:39.7
HOT-2 *.

11:18:41.4
HOT-1 close close your eyes touch your nose yeah alright good.

11:18:43.5
HOT-2 good cool.

11:19:09.5
HOT-2 v-ref one thirty one.

11:19:11.1
HOT-1 one thirty one set and cross checked.

11:19:14.1
HOT-2 flight instruments and bugs altimeters.

11:19:15.9
HOT-1 two nine one six.

11:19:17.3
HOT-2 two nine sixteen.

11:19:19.2
HOT-2 brakes.

11:19:20.8
HOT-1 max auto.

11:19:21.1
HOT-2 maximus set.

11:19:44.9
HOT-2 [sound of person humming]

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:19:55.3
HOT-2 cloudy down here.

11:20:37.5
CAM-1 I can see ah the reservoir up there.

11:21:15.4
CAM-1 mu's forty three forty three thirty nine.

11:21:22.4
CAM-1 so that's the only difference I can hear.

11:21:23.7
HOT-2 what was it.

11:21:25.4
CAM-1 forty three forty three thirty nine.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:20:39.3
CTR American twenty two fifty three information Whiskey is now current.

11:20:42.5
RDO-1 we'll pick it up.

11:20:43.3
ATIS ...* temperature minus five dewpoint minus seven altimeter two niner one four I-L-S approaches landing and departing runway one niner runway one niner M-U's forty three forty three thirty nine at one eight one zero reported by a SAAB friction tester thin loose snow over packed thin packed snow and ice on runway taxiway and ramps runway one niner MALS four hundred foot light bar out of service personnel and equipment on runway for snow removal braking action advisories are in effect hazardous weather information for the Northwest region available from flight watch or flight service PIREP time one seven three seven a Challenger thirty I-L-S runway one niner reported the first and second third of the runway braking action good last third braking action poor advise on initial contact you have information Whiskey. Jackson Hole tower information Whiskey time one eight one five wind one niner zero at six visibility three quarter light snow ceiling four hundred broken one thousand overcast temperature minus five...

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:21:27.6
HOT-2 okay I like that.

11:21:29.6
HOT-2 ah I heard men and equipment are clearing the runway right now too.

11:21:31.5
CAM-1 what.

11:21:33.0
CAM-1 what.

11:21:33.2
HOT-2 they they're clearing the runway right now is what they are saying on ATIS too right so.

11:21:35.4
CAM-1 yeah.

11:22:03.4
CAM-1 fourteen.

11:22:08.6
HOT-2 fourteen set.

11:22:10.8
CAM-1 I-L-S one niner basically ah one ninety at six on your winds three quarters light snow and still four hundred over.

11:22:16.8
CAM-2 alright.

11:24:00.6
HOT-2 heat?

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:22:26.9
RDO-1 American twenty two fifty three has Whiskey.

11:22:30.4
CTR American twenty two fifty three roger.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:24:01.7
HOT-1 yep go ahead.

11:24:06.4
PA-1 ah there's also one other thing I would like to mention going to Jackson Hole if you've not been here before relatively short runway up here in the mountains it's been snowing today we don't ah try and make a smooth landing here at Jackson Hole we just ah put the aircraft ah on the runway very quickly and firmly and go into full reverse and then use a heavy amount of braking make sure we stop in the first ah part of the runway so ah just be aware of that that's normal procedure for a mountain airport.

11:24:35.6
HOT-2 fifteen thousand.

11:24:36.6
HOT [sound of single chime]

11:25:21.2
HOT-2 sixteen for fifteen.

11:25:24.1
HOT-1 check we're sterile seat and smoking signs on.

11:25:35.8
HOT-2 I see a little ice out there on the window and I got it on my probe my ah windshield wiper out here.

11:25:43.9
HOT-1 I'm not showing anything uh is it?

11:25:44.0
HOT-2 little flake I got a couple little flakes on my eh forward edge of that ole windshield wiper out there.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:24:29.5
CTR American twenty two fifty three descend and maintain one five thousand.

11:24:32.8
RDO-1 one five thousand American twenty two fifty three.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:25:53.8
HOT-1 oh yeah just a little bit on that ah leading edge ju-

11:25:56.5
HOT-2 yeah.

11:25:57.3
HOT-1 little light rime level at fifteen.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:26:14.3
RDO-1 Jackson twenty two fifty three.

11:26:19.2
OPS hey captain @ @ here.

11:26:21.1
RDO-1 how you doin' ah looks like the runway's pretty good we got forty three forty three thirty nine ah little bit light snow eh.

11:26:27.1
OPS okay did you just get that the SAAB just came off um so yeah its uh a little better maybe than it was in the run out especially.

11:26:35.8
RDO-1 yeah that's what it looks like to us he just came off and they uh quickly changed the ATIS on it so uh it shouldn't be a problem we're just about eight miles out of DUNOIR so ah it should be on the ground in ah about thirty five after the hour.

11:26:46.4
OPS very good uh we'll see you there.

11:26:48.6
RDO-1 see you then.

11:26:55.0
CTR American twenty two fifty three cross DUNOIR V-O-R at or above one three thousand cleared I-L-S approach Jackson airport.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:26:56.5
CAM-1 look at the ice.

11:27:31.6
HOT-1 you don't see much on this machine so you know you're gettin' it.

11:27:34.8
HOT-1 remind me to hit the tail ah as we get to ah to FAPMO.

11:27:37.3
HOT-2 okay.

11:27:39.1
HOT-2 alright.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:27:01.5
RDO-1 okay cross DUNOIR at or above one three thousand ah cleared for the I-L-S ah runway one niner approach to ah Jackson Hole American ah twenty two fifty three.

11:27:11.6
RDO-1 and f-y-i up here at fifteen thousand American twenty two fifty three's getting light rime ice.

11:27:19.9
CTR Cactus seventy eight roger and American twenty two fifty three say again.

11:27:23.7
RDO-1 ah we're gettin' light rime ice here at ah one five thousand.

11:27:27.2
CTR American twenty two fifty three roger.

11:28:00.2
CTR American twenty two fifty three do you have a ah temperature there.

11:28:05.7
RDO-1 standby.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:28:10.8
HOT-1 where's my temperature?

11:28:22.9
HOT-2 alright inside of DUNOIR if you set eleven for me.

11:28:26.9
HOT-1 inside DUNOIR one one thousand for ah QUIRT.

11:28:33.2
HOT-1 one one thousand.

11:28:34.9
HOT-2 eleven thousand set.

11:28:35.0
HOT-1 I show you on the radial.

11:28:37.1
HOT-2 thank you.

11:29:03.6
HOT-2 below two forty flaps one.

11:29:06.8
HOT-1 below two forty verified.

11:29:08.1
CAM [sound similar to flap handle movement]

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:28:12.3
RDO-1 minus sixteen degrees ah ah's what we're showin' up here.

11:28:18.2
CTR American twenty two fifty three roger let me know if you get out'a that ice please.

11:28:22.2
RDO-1 wilco.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:29:09.8
HOT [sound of weak ident] (continues for approximately 30 seconds,
increasing in volume and clarity)

11:29:13.6
HOT-1 little weak on the ah ident here.

11:29:31.7
HOT-2 below two twenty flaps five.

11:29:35.7
HOT-1 verified flaps five.

11:29:36.8
CAM [sound similar to flap handle movement]

11:29:38.9
HOT-1 ah I-L-S one niner identifies Jackson Hole.

11:29:42.7
HOT-2 thank you.

11:29:46.9
HOT-1 there's the ground.

11:29:48.2
HOT-2 below two ten flaps fifteen.

11:29:52.7
HOT-1 verified.

11:29:53.7
CAM [sound of mechanical click]

11:30:13.4
HOT-2 below one ninety five flaps twenty.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:30:05.8
RDO-1 and Salt Lake American twenty two fifty three we came out of the ice
about one three thousand.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:30:17.8
CAM-1 verified.

11:30:18.5
CAM [sound similar to flap handle movement]

11:30:22.8
HOT-1 it's startin' tah come off do you see that.

11:30:24.7
HOT-2 yep.

11:30:28.0
CAM [sound of mechanical clicks]

11:30:29.8
HOT-2 spoilers are armed.

11:30:31.1
HOT-1 armed.

11:30:34.5
HOT-1 okay eleven ah twelve for eleven thousand.

11:30:37.1
HOT-2 twelve for eleven.

11:30:37.9
HOT-1 there's the dam at Jackson Lake.

11:31:11.4
HOT-2 in the turn.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:30:14.9
CTR American twenty two fifty three roger contact Jackson tower one one eight point zero seven good day.

11:30:19.3
RDO-1 eighteen zero seven talk to you on the way out American twenty two fifty three.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:31:12.8
HOT-1 there's the turn.

11:31:18.0
HOT-2 come'n inside of QUIRT I got the localizer thank you ninety seven hundred feet please.

11:31:20.4
HOT-1 altitude capture.

11:31:23.9
HOT-1 ninety seven.

11:31:24.8
HOT-2 ninety seven.

11:31:32.0
HOT-2 and approach is armed.

11:31:33.9
HOT-1 'kay good.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:31:36.4
RDO-1 Jackson ah tower American twenty two fifty three is at QUIRT.

11:31:42.1
TWR American twenty two fifty three Jackson tower report FAPMO.

11:31:45.9
RDO-1 report FAPMO American twenty two fifty three missed you yesterday what happened?

11:31:49.5
TWR American twenty two fifty three I thought it was noon that's what I was told I'm real sorry about that we need to try again though.

11:31:56.6
RDO-1 yeah we will ah fortunately I'll talk to you on the ground about it.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:32:03.7

HOT-2 alright loc capture glide slope's armed.

11:32:08.6

HOT-1 loc captured glide slope armed that's confirmed.

11:32:21.3

HOT-2 gear down.

11:32:23.4

HOT-1 below two hundred fifty knots gear down.

11:32:55.9

HOT-2 gear's down below one ninety flaps twenty five.

11:32:57.0

CAM-1 verified down.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:32:00.2

TWR American twenty two fifty three roger.

11:32:25.0

TWR American twenty two fifty three at one seven three seven a Challenger landed reporting the first and second half braking action good * last oh sorry the first and second third braking action good the last third braking action poor.

11:32:38.1

RDO-1 ah twenty two fifty three copy that an' uh we got the latest mu on the latest ATIS we got that ah PIREP too thank you very much.

11:32:45.4

RDO-1 you're gonna see us ah brake real hard in the first part of the runway.

11:32:50.1

TWR American twenty two fifty three roger and request braking action upon arrival.

11:32:54.6

RDO-1 wilco.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:32:59.0
HOT-1 verified.

11:32:59.6
CAM [sound of mechanical click]

11:33:10.4
HOT-1 gear.

11:33:11.2
HOT-2 gear's down.

11:33:11.9
HOT-1 down.

11:33:13.1
HOT-1 cleared the approach.

11:33:15.0
HOT-2 glide slope's captured missed is comin' in.

11:33:17.3
HOT-1 okay glide slope capture fourteen thousand that's set.

11:33:19.5
HOT-2 set.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:32:57.7
TWR American twenty two fifty three if you could take note of bases tops turbulence and icing I'd appreciate that as well .

11:33:03.1
RDO-1 wilco the only icing we've had so far we were at about fifteen thousand feet got light rime ice.

11:33:09.5
TWR roger.

11:33:23.0
RDO-1 and American ah twenty two fifty three is FAPMO.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:33:34.5

HOT-1 two sixty at five now so that's a crosswind okay.

11:33:38.1

HOT-2 yes and ah below one sixty two flaps thirty.

11:33:41.4

CAM [sound of mechanical double click]

11:33:42.6

HOT-1 verified.

11:33:43.0

CAM [sound of mechanical click]

11:33:47.4

HOT-1 flaps.

11:33:48.2

HOT-2 I see thirty.

11:33:49.3

HOT-1 thirty checklist complete cleared to land brakes f* everything's good.

11:33:51.8

HOT-2 okay got loc glideslope.

11:34:08.3

HOT-2 radio altimeter's alive.

11:34:12.6

HOT-2 right FAPMO lookin' got that good.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:33:26.0

TWR American twenty two fifty three wind two six zero at five runway one
niner cleared to land.

11:33:31.9

RDO-1 cleared to land ah runway one niner American twenty two fifty three.

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

11:34:16.9
EGPWS twenty five hundred.

11:34:30.1
HOT-1 ice is breakin' up a little bit.

11:34:34.7
HOT-1 minus six.

11:35:04.5
HOT-2 I see the ground.

11:35:06.3
HOT-1 yep.

11:35:40.2
HOT-1 see the ground way out here.

11:35:41.8
HOT-2 yeah.

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

11:34:40.7
AC American at Jackson Delta thirteen thirty one.

11:34:45.4
RDO-1 go ahead this is American twenty two fifty three.

11:34:47.5
AC yeh could you give us a PIREP when you br*k *--

11:34:49.2
TWR broadcasting tower.

11:34:52.4
RDO-1 we're still airborne.

11:34:53.8
RDO [sound of double microphone click]

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:35:42.4
HOT-1 yeah.

11:35:43.2
HOT-2 forward visibility's not very good.

11:35:45.0
HOT-1 no.

11:35:47.3
HOT-1 should be good because we're fifteen hundred feet above the ground we see down real well.

11:36:07.4
HOT-1 yeah Moose Lodge should be right here somewhere I...

11:36:13.0
HOT-1 there's Black Tail Butte right there...I see it...Moose Lodge is ah twelve o'clock low I see the lodge.

11:36:17.8
HOT-2 yep we got the river a-here I got the river and a bridge.

11:36:22.0
HOT-1 yep.

11:36:30.1
HOT-1 one thousand feet checklist complete cleared to land.

11:36:30.8
EGPWS one thousand.

11:37:05.2
EGPWS five hundred.

11:37:06.7
HOT-2 pickin' up the runway.

11:37:07.3
HOT-1 speed's good pickin' up the runway I agree with you.

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

11:37:10.8

HOT-1 there's the lights sixty nine fifty.

11:37:12.3

HOT-2 get the lights.

11:37:13.9

HOT-2 autopilot's comin' off.

11:37:15.3

HOT-1 okay.

11:37:16.3

HOT-1 ease er' down there.

11:37:18.0

HOT-2 throttles are off.

11:37:28.4

HOT-1 'bout two knots one knot slow.

11:37:31.9

HOT-1 keep er' comin' down push 'er down.

11:37:35.9

EGPWS one hundred.

11:37:39.2

EGPWS fifty.

11:37:40.3

EGPWS forty.

11:37:40.7

HOT-1 get 'er on.

11:37:41.4

EGPWS thirty.

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:37:42.3
EGPWS twenty.

11:37:43.1
EGPWS ten.

11:37:44.5
HOT-1 very good.

11:37:44.8
CAM [sound of multiple mechanical clicks and thumps]

11:37:46.3
HOT-1 deployed.

11:37:47.0
CAM [sound of multiple mechanical clicks and thumps]

11:37:47.5
HOT-1 two in reverse.

11:37:48.0
HOT-2 no reverse [voice sounds strained].

11:37:48.8
HOT-1 I got it.

11:37:49.4
HOT-1 get the (rers) get the reverse.

11:37:51.1
HOT-1 I got it you steer.

11:37:51.1
HOT-2 I can't get it.

11:37:52.9
HOT-2 I'm steerin'.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

11:37:53.6
HOT-1 auto brakes.

11:37:54.5
CAM [sound of physical exertion] [sound of multiple mechanical clicks and thumps]

11:37:58.9
HOT-1 heh.

11:37:59.6
HOT-1 alright I got max brake.

11:38:03.6
HOT-2 #.

11:38:05.4
HOT there we go.

11:38:06.4
HOT-2 I don't know what the # is wrong.

11:38:08.3
HOT-2 son of a #.

11:38:11.1
HOT-2 we're screwed.

11:38:17.3
CAM [sound of rumbling]

11:38:24.3
HOT-1 shut that.

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

11:38:13.9
RDO-2 and American ah twenty two fifty three is goin' off the end of the runway.

11:38:19.4
TWR American twenty two fifty three roger.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:38:26.5
HOT-2 mother #.

11:38:35.0
PA-1 flight attendants stay in the airplane passengers stay in the airplane.

11:38:40.0
HOT-1 what happened?

11:38:41.3
CAM-2 I didn't get * - auto * - I couldn't pull-

11:38:49.4
HOT-1 thank-

11:38:58.0
CAM-2 they would not come up.

11:38:59.2
CAM-1 I know it.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:38:32.4
RDO-1 call the ground crew.

11:38:42.0
TWR American twenty two fifty three the...American twenty two fifty three trucks are rollin'.

11:38:50.7
RDO-1 thank you we're gonna stay in the airplane.

11:38:53.0
TWR American twenty two fifty three roger.

11:38:56.1
SAAB Jackson gr- ah Jackson tower airport SAAB can you close the runway please.

11:39:00.8
TWR airport SAAB copy wilco.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:39:00.9
CAM-1 brakes di- they did not release.

11:39:05.1
CAM-1 well...end of our career.

11:39:06.9
HOT-2 # @...it's not the end we did everything right we didn't get the thrust
reversers.

11:39:12.2
HOT-1 yeah.

11:39:15.6
HOT-2 son of a #.

11:39:18.1
HOT-2 ape- you got the A-P-U goin'.

11:39:19.4
PA-1 ah ladies and gentlemen ah our ah thrust reversers didn't come on and
we're gonna roll the ah ground crew. went off the edge of the runway
here and uh ground crews are gonna come here and they're gonna
assist us off the airplane. I've been here nineteen years and ah we got
virtually no assist on the braking.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:39:03.9
SAAB and uh myself and the ARFF equipment will be on the runway.

11:39:34.9
ARFF and American this is airport ARFF ah do you need any more assistance
as far as injuries er' ah you have any-

11:39:41.3
RDO-2 ah we're checkin' in the back right now for American twenty two fifty
three.

11:39:44.7
TWR American twenty two fifty three you're checkin' for injuries right now is
that what you said?

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

11:39:44.8

HOT-1 any injuries?...yeah that's the engines...right.

11:39:52.9

HOT-1 shut the engines.

11:39:54.9

HOT-2 A-P-U up?

11:39:55.7

HOT-1 nobody no injuries yeah A-P-U's up.

11:40:03.8

HOT-2 son of a #.

11:40:07.4

HOT-1 well.

11:40:08.8

PA-3 ah ladies and gentlemen just please remain seated with your seat belts fastened until further advised thank you.

11:40:14.7

PA-1 ah ladies and gentlemen captain @. they're gonna ah ah send out a ah trucks and ah check out the airplane first and then ah get us off to ah to the terminal here. ah we'll find out a way in just a minute. we're not sure what ah happened we're not sure if the braking didn't work. looked like it was but our reversers did not work so ah we're not sure what happened here. ah we'll talk to you as soon as I get more information. please remain please remain seated until you hear instructions from myself or the flight attendants.

11:40:41.8

HOT-2 did * the flight attendants everybody okay in the back and everything? they're wantin' to know on the ground.

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

11:39:48.5

RDO-2 yeah captains on the horn ah ah talkin' to the ah flight attendants here right now.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:40:44.8
HOT-1 yeah...yeah they're okay.

11:40:49.9
HOT-2 (we) told fire fire department that.

11:40:52.0
HOT-1 hm.

11:40:53.0
HOT-2 we tell the fire department that everybody's ok no injuries.

11:40:55.0
HOT-1 yeah yeah.

11:41:10.2
HOT-1 we got no braking action.

11:41:12.8
HOT-2 we didn't get thrust reversers out .

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:40:47.7
RDO-1 Jackson ops uh we off the runway did you copy that.

11:40:56.7
RDO-2 and uh fire department and ground American twenty two fifty three there are no injuries uh everybody's fine ah we'll just need to have ah ah * may as well come out and check the airplane out and we'll go from there.

11:41:01.0
RDO-1 Jackson ops copy.

11:41:12.8
ARFF ah this is the airport ARFF ah we copy all that ah we'll get some maintenance techs out here and we'll start ah doin' snow removal to get you out.

11:41:22.4
RDO-2 okay thank you.

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

11:41:23.7
HOT-1 alright I'm gonna walk the airplane you stay on the radios.

11:41:25.5
HOT-2 okay to park the brakes?

11:41:26.9
HOT-1 yeah.

11:41:29.5
HOT-2 'kay brakes are parked.

11:41:30.7
CAM-1 there was no way to go around by the time we saw it either.

11:41:33.3
HOT-2 no we were sliding and uh uh I couldn't get the thrust reverser would not come out they were stuck.

11:41:39.7
CAM-1 that's why I tried * gimme the thrust reversers you wouldn't give 'em to me yeah.

11:41:41.3
HOT-2 and I went back and um pulled again and we would not could not get thrust reversers.

11:41:56.8
HOT-2 I'm a run a ah after landing checklist here.

11:41:58.4
CAM-1 yeah go ahead.

11:42:02.8
HOT-2 flight directors are off autothrottle arm switch is off.

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

11:42:06.8
TWR crash commander all vehicles have ah access to runway one niner.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:42:07.1
CAM-2 flaps * spoilers stab trim.

11:42:14.4
PA-1 I apologize for that I'm not sure why the brakes didn't ah they didn't take and the thrust reversers didn't come on. there's no use ah getting off the airplane. is everybody okay uh alright we're going to uh bring up and they're gonna bring a uh a crew up here to remove the snow uh so that we can uh get a truck so uh may have to walk back to the terminal but uh we're just a little bit off the edge of the runway into the overrun and uh we don't want anybody to get hurt jumpin' into this heavy snow down here so we stay with the airplane as long as everything is runnin' good and uh should be just about fifteen twenty minutes we'll have more information. sorry about that.

11:43:01.9
CAM-1 did we hit the uh *.

11:43:03.1
HOT-2 no that's I don't that's what I'm askin' about there's one back here that's why I kicked it to the right.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:42:11.8
ARFF roger copy that thank you.

11:42:47.1
RDO-2 and ah fire rescue American ah twenty two fifty three.

11:43:17.5
RDO-2 and tower American twenty two fifty three.

11:43:20.1
TWR American twenty two fifty three Jackson tower.

11:43:22.9
RDO-2 yeah is there any ah vehicles out there that can look I just want to confirm that we missed the ah the ah the ah lighting ah the departure end light er approach end lighting here ah we steered just to the right of it I just want to make sure we didn't clip that.

**TIME and
SOURCE**

**INTRA-AIRCRAFT COMMUNICATION
CONTENT**

11:43:58.1
CAM-1 all right.

11:44:01.1
HOT-2 I asked 'em they're checking with a uh a uh truck out here to make sure we missed that other stanchion there's one just like that right behind us that's why I kicked it I kicked us right to make sure we're gonna' clear that.

11:44:01.2
CAM-1 where ya at?

11:44:09.2
CAM-1 yeah I can't see it.

11:44:16.2
HOT-2 should we pull the uh circuit breaker?

11:44:17.8
CAM-1 yeah find it.

**TIME and
SOURCE**

**AIR-GROUND COMMUNICATION
CONTENT**

11:43:36.7
TWR American twenty two fifty three copy break airport SAAB did you copy that request?

11:43:47.8
TWR Airport SAAB Jackson tower.

11:43:57.3
TWR Crash Jackson tower.

11:44:09.5
AC Jackson hole tower Delta thirteen thirty one.

11:44:13.0
TWR Delta thirteen thirty one standby.

11:44:19.6
CRASH Jackson tower Crash two.

TIME and
SOURCE

INTRA-AIRCRAFT COMMUNICATION
CONTENT

11:44:26.6
END OF TRANSCRIPT (LAST PORTION OF FLIGHT)
END OF RECORDING

TIME and
SOURCE

AIR-GROUND COMMUNICATION
CONTENT

11:44:22.9
TWR Crash two Jackson tower American twenty two fifty three-