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

GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

WPR15MA243AB

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

March 24, 2016

Cockpit Voice Recorder

Specialist's Factual Report
By Bill Tuccio, Ph.D.

1. EVENT SUMMARY

Location:	San Diego, California
Date:	August 16, 2015
Aircraft:	North American Sabreliner, Registration N442RM
Operator:	BAE Systems Technology Solutions & Services, Inc.
Flight:	Eagle One
NTSB Number:	WPR15MA243AB

On August 16, 2015, about 1100 Pacific daylight time (PDT), two airplanes, a Cessna 172, N1285U, and an experimental Sabreliner, (Sabre 60), N442RM, collided midair approximately 1 mile northeast of Brown Field Municipal Airport (SDM), San Diego, California. The two pilots and two mission specialists aboard the Sabreliner were fatally injured. The pilot of the Cessna, the sole occupant of the airplane, was fatally injured. The Sabreliner was being operated as a public use flight by the U.S. Department of Defense in support of the U.S. Navy. The Sabreliner was registered to BAE Systems Technology Solutions & Services, Inc. The Cessna was registered to Plus One Flyers, Inc., of San Diego, California, and operated by the pilot as a personal flight under the provisions of 14 *Code of Federal Regulations* Part 91. Both airplanes were destroyed. Visual meteorological conditions prevailed at SDM. Both airplanes departed SDM earlier that day and a mission flight plan was on file for the Sabreliner; no flight plan was filed for the Cessna 172. A controller in the SDM air traffic control tower (ATCT) was in contact with both accident airplanes prior to the collision. 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 November 12, 2015 and a partial transcript was prepared for the 30-minute recording (see attached).

2. GROUP

Chairman:	Dr. Bill Tuccio Aerospace Engineer NTSB
Member:	Andrew Swick Air Safety Investigator NTSB

Member:	Dale Williams Accident Investigator Federal Aviation Administration
Member:	Brad Thiele Project Manager – Special Projects BAE Systems
Member:	Mark Morter Director, Mojave and Palmdale Operations BAE Systems

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model:	**Fairchild GA-100**
Recorder Serial Number:	**01803**

3.1 CVR Carriage Requirements

Per federal regulation, multiengine, turbine engine powered aircraft operating under 14 CFR Part 91 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. The accident aircraft was manufactured in 1974. When the CVR is deactivated or removed from the airplane, it retains only the most recent 30 minutes of CVR operation.

3.2 Recorder Description

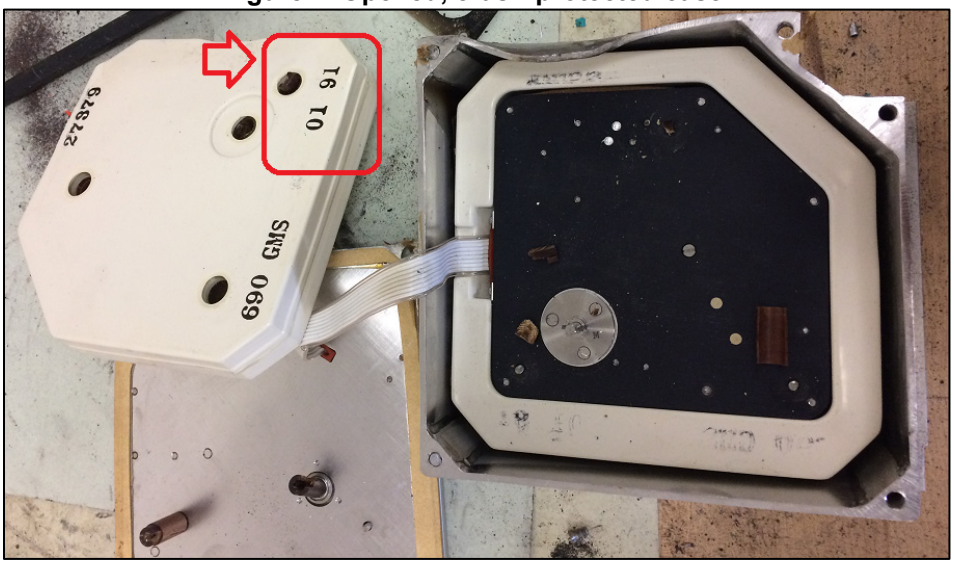
This model CVR, the Fairchild GA-100, records a minimum of 30 minutes of analog audio on a continuous loop tape in a four-channel format: one channel for each flight crew, one channel for a cockpit observer, and one channel for the cockpit area microphone (CAM).

3.3 Recorder Damage

Upon arrival at the laboratory, it was evident that the exterior of the CVR had sustained some heat and structural damage, as shown in figure 1. The outer case was removed and the interior crash-protected case had minor structural damage. Figure 2 shows the opened, crash-protected case with a date of “01 91” stamped on the heat-protective cover. The magnetic tape was retrieved from within the crash-protected case and was successfully read out.

Figure 1. CVR as received (istometric and top views).

Figure 2. Opened, crash-protected case.



3.4 Audio Recording Description

The CVR was manufactured in 1991 and there was no evidence the CVR had been overhauled since the manufacture date (though the underwater locator beacon had an expiration date of 2021). When the CVR records new information, a built-in erase mechanism first erases older content before writing new content. In this case, the CVR contained fragments of multiple, older recordings, consistent with an incomplete erase of older content before new content was recorded; as such, recording quality was

degraded, especially on channel number 4. Each channel's audio quality is indicated in Table 1.[1]

Table 1: Audio Quality.

Channel Number	Content/Source	Quality	Duration
1	Pilot, Copilot, and/or Mission Specialists	Fair	30 min
2	CAM	Poor	30 min
3	Unknown	Unusable	30 min
4	Pilot, Copilot, and/or Mission Specialists	Fair	30 min

3.5 Timing and Correlation

Timing on the transcript was established by correlating the CVR events to common events recorded by air traffic control (ATC). Specifically, two radio transmissions that the aircraft made at 0029:45.2 and 0033:17.0 CVR Elapsed Time (time from the beginning of the recording) were correlated to the same radio transmissions recorded by SDM tower at 1759:55.3 and 1803:08.8 Universal Coordinated Time (UTC), respectively. Each of the two radio transmissions acted as an anchor point for a linear interpolation allowing for adjustment of CVR playback speed and a reference to UTC time. Conversion from UTC to PDT was accomplished by subtracting 7 hours from UTC. The final relationship of CVR Elapsed Time to PDT (after adjustment of playback speed) was:

PDT = CVR Elapsed Time + 1032:30.4

Therefore, times in the remainder of this report are expressed as PDT.

3.6 Description of Audio Events

A description of events from the CVR follows. Due to the poor quality of the CVR recording, the ATC recording was used to enhance the accuracy of this report; when ATC recording was used for a clarification, the enhancement is footnoted.

In this report, the pilot-in-command is referred to as the pilot and the second-in-command is referred to as the copilot. Throughout the flight, the pilot was communicating on the radio and responding to checklists, consistent with the pilot acting as the monitoring pilot and the copilot acting as the flying pilot. According to the IIC, the pilot was seated in the left seat and the copilot was seated in the right seat.

The other aircraft involved in the collision, N1285U, is only mentioned twice in this transcript, starting just before the collision at 1103:04.7 PDT. According to ATC recordings not recorded on Eagle One's CVR, N1285U had reported inbound to Brown Tower at 1049:44 PDT requesting touch and goes. See the ATC Group Chairman Factual Report in the public docket of this accident for further details.

[1] See attached CVR Quality Rating Scale.

The recording began at about 1032:28 PDT, while Eagle One was enroute to SDM at 4,500 feet and communicating with Beaver Control[2]. The crew engaged in various social conversations on the intercom, which involved mostly the pilot and copilot, with occasional comments likely interjected by one or both of the mission specialists.[3]

At about 1047:34 PDT, the SDM ATIS[4] was recorded on the CVR. However, due to the poor CVR quality, only parts of the ATIS could be discerned: wind from 130 degrees at 3 knots, altimeter 29.98, and runway 26 in use.

At about 1048:40 PDT, the crew discussed past coordination issues between Beaver Control and SoCal Approach. At about 1054:02 PDT, Beaver Control advised Eagle One they were unable to effect a hand-off to SoCal approach and advised Eagle One to squawk VFR. Eagle One then contacted SoCal Approach, advising they were squawking 4644 and were "RTB"[5] to SDM.

At about 1056:42 PDT, the pilot commented on the intercom about the haze over Tijuana followed by a short social conversation about travel to Tijuana.

At about 1057:48 PDT, the pilot commented on the intercom, "turn the rec—recky lights are on."

At about 1058:23 PDT, SoCal Approach advised sky diving activity would commence in two minutes.

At about 1058:34 PDT, SoCal Approach advised Eagle One to contact Brown Tower (SDM) on frequency 128.25. Eagle One's pilot acknowledged the hand-off.

The rest of the recording, from 1058:34 PDT until the end of the recording at 1103:10 PDT, is described in the transcript attached to this report.

[2] Beaver Control was an ATC facility.
[3] Conversations on channel 4 may have included old, un-erased content. When mission specialists were recorded on the CVR (other than old, un-erased content), this was indicative of the content being broadcast to the pilot and copilot, based on the nature of the CVR/audio system installation.
[4] Automatic Terminal Information Service (ATIS) is the continuous broadcast of recorded noncontrol information in selected high activity terminal areas. ATIS information includes the time of the latest weather sequence, ceiling, visibility, obstructions to visibility, temperature, dew point (if available), wind direction (magnetic), and velocity, altimeter, other pertinent remarks, instrument approach and runway in use.
[5] RTB means "return to base."

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.

Summary of a Fairchild GA-100 tape cockpit voice recorder, serial number 01803, installed on a BAE Systems Technology Solutions & Services, Inc. (N442RM) Sabreliner, which collided with a Cessna 172 in San Diego, CA.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
RDO	Radio transmissions from N251MY
SoCal	Radio transmission from the SoCal approach controller
TWR	Radio transmission from the FLL airport tower controller
AC-18WZ	Radio transmission from aircraft “18WZ”
AC-5058U	Radio transmission from aircraft “5058U”
AC-5161U	Radio transmission from aircraft “5161U”
AC-60R	Radio transmission from aircraft “60R”
AC-6ZP	Radio transmission from aircraft “6ZP”
AC-LVV	Radio transmission from aircraft “LVV”
AC-N1285U	Radio transmission from aircraft “N1285U”
AC-N5442P	Radio transmission from aircraft “N5442P”
AC-MISC	Radio transmission from a miscellaneous aircraft
PA	Passenger cabin public address system
-1	Voice identified as pilot
-2	Voice identified as copilot
-3	Voice identified as a mission specialist
-?	Voice unidentified
*****	Unintelligible word
( )	Questionable insertion
[ ]	Editorial insertion and/or paraphrased dialogue

Note 1: Times are expressed in eastern daylight time (EDT).

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.

Note 5: “TWR” refers to the tower position and does not differentiate if different people occupied the position.

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
10:32:28 PDT **START OF RECORDING**			
10:58:34 PDT **START OF TRANSCRIPT**			
		10:58:34.2 **SoCal**	Eagle One contact Brown Tower one two eight point two five. goodday.
		10:58:39.3 **RDO-1**	Eagle One (push'n) tower goodday.
10:58:41.9 **CAM**	[sound of two clicks]		
10:58:43.8 **HOT-2**	number two.		
		10:58:47.7 **AC-5161U**	five one six one uniform seven miles east inbound with bravo for landing.[6]
		10:58:55.0 **TWR**	Global Express one (eight) whiskey zulu turn base two six right. cleared to land.[6]
		10:58:58.3 **AC-18WZ**	turn base two six right. cleared to land. ah eight whiskey zulu.[6]

[6] Due to the poor quality of the CVR, the Brown Tower facility recording was used to clarify this transmission.

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
		10:59:03.3 **RDO-1**	Brown Tower Eagle One nine west inbound bravo full stop. [on the ATC recording, RDO-1's transmission was simultaneous with another transmission,][6]
		10:59:06.5 **AC-MISC**	**taxi to the ah fuel and main terminal.[6]
		10:59:08.4 **TWR**	Eagle One Brown Tower maintain at or above two thousand feet enter right traffic for runway two six right.[6]
		10:59:12.7 **RDO-1**	two thousand feet right traffic two six right. Eagle One.
		10:59:18.2 **AC-5058U**	Brown Tower (Stationair) five zero five eight uniform two six left. ready to go.[6]
10:59:20.2 **HOT**	[sound of high pitch whine for about 20 seconds (about 4500 Hz), similar to flap in motion]		
		10:59:21.4 **TWR**	Stationair five zero five eight uniform hold short runway two six right at charlie. arriving traffic.[6]
10:59:23.6 **HOT-1**	before landing. down to the line complete.		
10:59:25.8 **HOT-1**	**.		

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
		10:59:27.0 **AC-5058U**	ahhh okay. hold short. ahh we're holding short of two six left. five eight uniform.[6]
		10:59:30.9 **TWR**	Stationair five eight uniform. I understand that. hold short of runway two six left at charlie.[6]
		10:59:33.2 **TWR-?**	I got it. [voice in background during the prior tower transmission. voice unidentified.][6]
		10:59:34.7 **AC-5058U**	roger.*
		10:59:35.5 **TWR**	Skybolt taxi to ramp via alpha [this communication, while clear on the ATC recording, was blocked on the CVR by the overlapping radio call related to "we're gonna park at customs."][7]
		10:59:35.5 **AC-MISC**	[first part of transmission blocked] we're gonna park at customs.
		10:59:37.7 **AC-MISC**	via alpha. Skybolt.[7]
10:59:39.6 **CAM**	[sound of 7 or 8 clicks, similar to moving a rotary dial]		

[7] The Brown Tower facility recording was used to clarify this transmission; it is possible this transmission was made on ground frequency rather than tower frequency.

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
		10:59:39.6 **TWR**	Stationair five eight uniform hold short of two six left.[6]
		10:59:41.8 **AC-5058U**	five eight uniform holding short of two six left.
		10:59:44.0 **AC-6ZP**	[foreign accent] Brown Tower Cessna six zulu papa request right downwind departure.
		10:59:49.2 **TWR**	Eagle One maintain at or above two thousand right traffic runway two six right.
		10:59:54.6 **RDO-1**	Eagle One right traffic two thousand for two six right.
		10:59:58.6 **AC-5161U**	five one six one uniform over TRIDENT. inbound landing bravo.[6]
		11:00:02.7 **TWR**	(Stationair) five one six one uniform Brown Tower roger. follow the ah Global Express mile final two six right. cleared to land.[6]
		11:00:10.6 **AC-5161U**	Global Express in sight. following for two six right. cleared to land. five one six one uniform.[6]
11:00:13.0 **HOT**	[sound of high pitch whine for about 2 seconds (about 4500 Hz), similar to flap in motion]		

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
11:00:15.8 **HOT-2**	okay.		
		11:00:16.1 **AC-18WZ**	confirm(ing) eight whiskey zulu cleared to land?[6]
		11:00:18.0 **TWR**	eight whiskey zulu is cleared to land on two six right.[6]
		11:00:20.1 **AC-18WZ**	cleared to land. two six right ah going to customs.[6]
		11:00:23.0 **TWR**	Stationair five eight uniform. two six right cleared for-- I'm sorry two six left. cleared for takeoff.[6]
11:00:27.2 **HOT**	[likely un-erased content from prior recording; voice of pilot]		
11:00:29.0 **HOT-2**	got one on short final.		
		11:00:29.2 **AC-5058U**	(ah sorry was that) for five eight uniform?[6]
		11:00:30.8 **TWR**	five eight uniform. cleared for takeoff two six left.[6]
		11:00:33.6 **AC-5058U**	*** takeoff. five eight uniform.[6]

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
		11:00:35.9 **TWR**	[static, similar to overlapping radio communications; on the ATC recording this was stated without static as "helicopter six zero romeo there's a ce- cen- ah correction a Stationair just ahead. they're going for the right runway. base leg for two six left."] [6]
11:00:43.7 **HOT-2**	gear up please.		
		11:00:45.6 **AC-6ZP**	[foreign accent] Brown Tower Cessna six zulu papa right downwind departure.[6]
11:00:46.4 **CAM**	[sound of high pitched whine (about 5,000 Hz) for about 10 seconds; start of whine contained the sound of clunk followed about 5 seconds later by another clunk, similar to landing gear extension]		
		11:00:49.3 **TWR**	C-Cessna six zulu papa right downwind departure approved. [sound of 3 short bursts of static, similar to 3 microphone clicks][6]
		11:00:53.0 **TWR**	[static, similar to overlapping radio communications; on the ATC recording this was stated without static, "helicopter six zero romeo. listen up [exclaiming]. turn crosswind."][6]
		11:00:55.6 **AC-MISC**	[static, similar to overlapping radio communications; on the ATC recording this was stated without static, "--line up for runway--"][6]

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
		11:00:56.5 **TWR**	[static, similar to overlapping radio communications; on the ATC recording this was stated without static, "or correction turn base."][6]
		11:00:58.3 **AC-60R**	six zero romeo turning base [transmission contained scratchy background noise].[6]
11:01:00.8 **HOT-2**	man we hit it perfect didn't we.		
		11:01:02.8 **AC-N5442P**	november five four four two papa. over flying Tiajuana.[6]
		11:01:05.8 **TWR**	five four four two papa Brown Tower enter on the left base for runway two six left. continue.[6]
11:01:08.4 **CAM**	[sound of increased background sound, similar to power increase]		
		11:01:10.9 **AC-N5442P**	two six left. five four four two papa. descending.[6]
11:01:15.5 **HOT-2**	got one on the runway.		
		11:01:16.3 **TWR**	Citation lima victor victor cross runway two six left (at) alpha into customs.[6]

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
11:01:19.2 **HOT-1**	wowww. he's like panicking [emphasis on panicking].		
		11:01:20.0 **AC-LVV**	** lima victor victor crossing two six left.[6]
		11:01:22.7 **TWR**	Global eight whiskey zulu turn left at bravo cross runway two six left. alpha to First Flight. ah correction alpha to the ramp and monitor ground.[6]
11:01:24.6 **HOT-1**	I got twelve o'clock on a climb out.		
11:01:26.3 **HOT-2**	got it. I got him.		
		11:01:30.5 **AC-18WZ**	alright. ah. left on bravo cross ah eight right and we need to go to customs sir.[6]
		11:01:38.2 **TWR**	eight whiskey zulu okay. straight ahead ah across alpha and go into customs.[6]
		11:01:42.1 **AC-18WZ**	alpha to customs ah eight whiskey zulu.[6]
11:01:43.1 **HOT-2**	(must be) the jump plane.		
11:01:44.8 **HOT-1**	yep.		

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
		11:01:45.0 **TWR**	helicopter six zero romeo runway two six left cleared low approach [emphasis on low approach]. low approach.
11:01:45.5 **CAM**	[sound of increased background noise, similar to power increase]		
11:01:49.0 **HOT-3**	see him right there?		
11:01:50.3 **HOT-2**	tally.		
		11:01:51.7 **AC-60R**	cleared for low approach two six left. six zero romeo [transmission contained, scratchy background noise].[6]
		11:01:54.9 **TWR**	november four two papa follow the helicopter ahead they'll make a low approach. you're number two. runway two six left cleared to land. [sound of repetitive, high-pitch tone in background of ATC transmission].[6]
		11:02:01.4 **AC-N5442P**	cleared to land runway two six left. we do not have the helicopter in sight.[6]
		11:02:05.2 **TWR**	helicopter six zero romeo make it one of those more expedient finals. not one of those minute and thirty second ones please.[6]

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
11:02:13.0 **CAM**	[sound of decreased background noise, similar to power decrease]		
		11:02:13.8 **RDO-1**	Eagle One is right downwind abeam. traffic to the left and right in sight.
11:02:14.2 **CAM**	[sound of high pitch whine for about 2 seconds (about 4500 Hz), similar to flap in motion]		
		11:02:17.5 **AC-60R**	expedient approach. * zero romeo. [transmission contained, scratchy background noise].[6]
		11:02:21.8 **AC-N5442P**	two eight left. ah left base to final. five four four two papa.
		11:02:28.0 **TWR**	[static, similar to overlapping radio communications; on the ATC recording this was stated without static, "november four two papa the helicopter's-r just over the underrun now."[6]
11:02:30.3 **CAM**	[sound of increased background noise, similar to power increase]		
11:02:32.4 **HOT-1**	you still got the guy on the right side?		

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
		11:02:32.8 **TWR**	Cessna six zulu papa [emphasis on call sign] make a right [emphasis on right] three sixty. right [emphasis] three sixty. rejoin the downwind.[6]
11:02:33.6 **HOT-2**	yeah we good.		
11:02:34.7 **HOT-1**	(good goin').		
11:02:36.0 **CAM**	[sound of decreased background noise, similar to power decrease]		
		11:02:39.3 **AC-6ZP**	[foreign accent] right three sixty. rejoin the downwind. Cessna six zulu pop.[6]
		11:02:42.9 **TWR**	Eagle One turn base two six right cleared to land.[6]
		11:02:45.1 **RDO-1**	Eagle One base gear stop right. cleared to land.
		11:02:48.9 **TWR**	Stationair six one uniform alpha to First Flight monitor ground [sound of repetitive, high-pitch tone in background of ATC transmission].[6]
11:02:50.1 **CAM**	[ratcheting sound followed by sound of thump]		

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
		11:02:51.6 **AC-5161U**	** monitor ground * six one uniform.[6]
11:02:54.5 **HOT-2**	woo hoo. busy.		
		11:02:56.6 **TWR**	Cessna six zulu papa tower.[6]
11:02:59.3 **HOT-1**	I see the shadow but I don't see him.		
		11:03:00.4 **AC-6ZP**	[foreign accent] turrrrning. Cessna six zulu papa.[6]
		11:03:04.7 **TWR**	november eight five uniform. tower.
		11:03:07.1 **AC-N1285U**	eight five uniform.
		11:03:08.6 **TWR**	are you still on downwind?---[8]
11:03:09.7 **CAM**	[sound of hiss]		
11:03:09.8 **HOT**	[sound of snap]		

[8] The entire Brown Tower transmission at 1103:07 PDT recorded by SDM Tower was, “Are you still on downwind sir, right downwind?” During this transmission, high-pitched tones were observed in the background.

TIME and SOURCE	INTRA-AIRCRAFT CONTENT	TIME and SOURCE	AIR-GROUND COMMUNICATION CONTENT
11:03:10.1 **CAM**	[sound of thump]		
11:03:10.2 **HOT**	[sound of clap]		
11:03:10.2 PDT **END OF TRANSCRIPT** **END OF RECORDING**			