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

SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

WPR13FA119
By
George Haralampopoulos

WARNING

The reader of this report is cautioned that the summary of a cockpit audio and image recording is not a precise science. The summary or parts thereof, if taken out of context, could be misleading. The summary 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 summary as the sole source of information.

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June 30, 2014

Cockpit Audio and Video

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1. EVENT

Location:	Acton, California
Date:	February 10, 2013
Aircraft:	Bell 206B JetRanger, N59518
Operator:	Orbic Air LLC
NTSB Number:	WPR13FA119

2. GROUP

A group was not convened.

3. SUMMARY

On February 10, about 0330 pacific standard time (PST), a Bell Helicopter 206B JetRanger, N59518, collided with terrain shortly after departing from a landing zone on a movie ranch near Acton, California. Orbic Air LLC, was operating the helicopter under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91. The commercial pilot and two passengers sustained fatal injuries; the helicopter sustained substantial damage. The local flight departed the landing zone (LZ) about 1 minute prior to the accident for the purpose of shooting an aerial video sequence. Dark night visual meteorological conditions prevailed, and no flight plan had been filed.

4. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following devices:

Recorder Manufacturer/Model: **Canon EOS 300PL**
Recorder Serial Number: **2430200140**

Recorder Manufacturer/Model: **Sound Devices 702T Audio Recorder**
Recorder Serial Number: **GR0106270000**

Recorder Manufacturer/Model: **GoPro Hero**
Recorder Serial Number: **HD3BB101 20B2F24**

4.1. Canon EOS 300PL Video Files

Upon arrival at the NTSB Vehicle Recorder Division, it was evident that the camera had sustained structural damage, as shown in figure 1. The Compact Flash card was removed and a read out was attempted in a Windows based PC; however, the files appeared corrupted. The file containing the accident, CC001601.MXF, was successfully extracted using the Canon XF Utility tool.

Figure 1. Canon EOS 300PL condition.

The video recorder was held by the passenger sitting in the back seat and was free to move. The view of the camera changed throughout the flight, capturing the front left side passenger and outward views from the left side of the aircraft. Sound was not captured and the length of the file was 4 minutes and 40 seconds.

4.2. Sound Devices 702T Audio Files

Upon arrival at the NTSB Vehicle Recorder Division, it was evident the device sustained negligible damage, as shown in figure 2. Four files were successfully extracted, A7T01.wav, B7T01.wav, B7T02.wav, and B7T03.wav. A7T01.wav contained the events leading up to the accident and B7T01.wav contained the accident event. The other files were not used in this report.

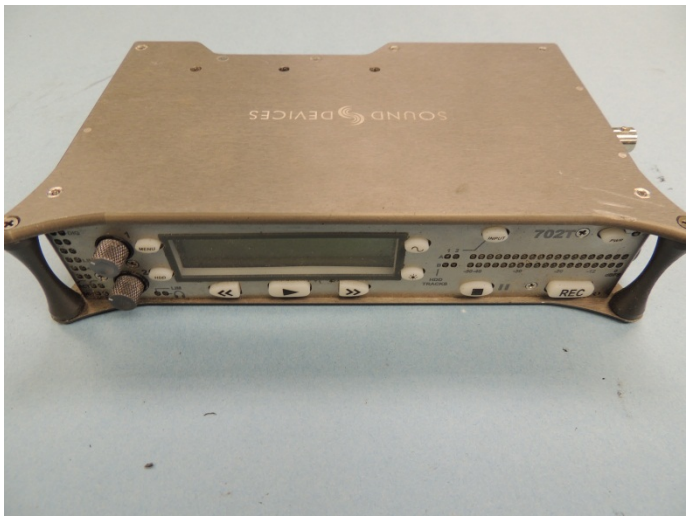

Figure 2. Sound Devices 702T condition.

The audio recorder contained the conversations between the pilot, two passengers, and ground crew. The total duration of the recording was about 56 minutes and 26 seconds.

4.3. GoPro Hero Video Files

Upon arrival at the NTSB Vehicle Recorder Division, it was evident the device was contained in its protective casing (figure 3). The device was removed and the micro SD card containing the video files was located. The micro SD card contained 7 files of which 3 did not pertain to the accident. The file containing the accident flight was located under file name GOPR0003.mp4.

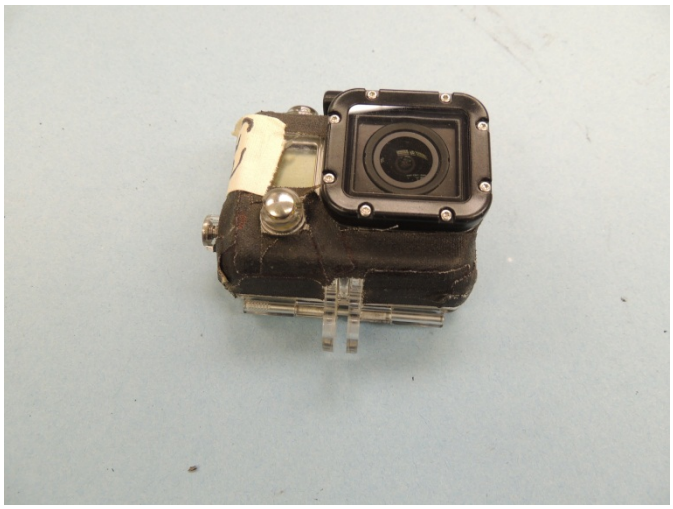

Figure 3. GoPro Hero condition.

The GoPro was mounted on the windshield facing inward towards the back of the aircraft and contained a view predominantly of the left side passenger's face. The back seat passenger was seen at times. Speech from all

three aircraft occupants were heard before takeoff while ambient noise from the aircraft was predominantly heard after takeoff. The file was 14 minutes and 56 seconds in length.

4.4. Timing and Correlation

The events leading up to the accident were captured only by audio from the Sound Devices 702T and are stored in the A7T01.wav file. The time is expressed in elapsed time. The format is MM:SS.t, where MM is minutes, SS is seconds, and t is tenths of seconds (when applicable).

The accident segment began with the start of the video captured by the GoPro. The Canon provided a second view of the accident at a later time, and the audio recording can be heard at a later time. A MPEG4 (.mp4) file was created that merged all three video and audio sources using Adobe Premiere Pro. The format is MM:SS.n, where MM is minutes, SS is seconds, and n is the frame number (when applicable).

The Sound Devices 702T audio captured the accident on the B7T01.wav file. The audio was correlated to the GoPro by matching phrases spoken by the second pilot to facial gestures on the GoPro. The audio and GoPro were synchronized at approximately 4:40.0 GoPro time.

The Canon EOS 300PL's file was correlated to the GoPro by using similar movements of the front left passenger captured by each device. An offset of 06:59.6 was added to the Canon (.mxf) file's elapsed time.

The combined file that merged all three sources was 11 minutes and 57 seconds in length, at 24 frames per second. The precise PST time of the accident flight or events leading up to the accident was not determined.

4.5. Summary of Prior Events

The captured audio contains events leading up to the accident that consisted of four "bag drops" by the accident aircraft. For the purpose of this report, a "bag drop" pertains to a scripted action performed by an actor onboard in which he releases a bag to a scripted location on the ground. Each bag drop is briefed and a discussion ensues after each bag drop on how to better position the bag and aircraft. The aircraft occupants consisted of the pilot in the right seat, an actor in the front left seat, and a cameraman sitting in the seat behind the actor.

This is a partial transcript of relevant content; the participants are the Pilot, Cameraman, and First Actor.

First Bag Drop

The times are expressed in elapsed time from the beginning of the audio recording. The format is MM:SS.t, where MM is minutes, SS is seconds, and t is tenths of seconds (when applicable).

At about 08:24 elapsed time, the audio began when the pilot performed a radio check with the two passengers. The pilot then radioed to call sign "Wrangler" and identified himself as Shooter One One.

At 08:41.8, the pilot states "Look at that, my mic is operating a light." Ambient noise is heard until 08:55.4, when an unidentified ground personnel states "Before you leave, why is the windscreen on the outside." To which unintelligible responses are exchanged. Ambient noise is heard until 10:01.2, when a discussion ensued about turning on lights for the comfort of the pilot,

10:01.2	Cameraman	let's turn that light on now.
10:02.8	First Actor	roger.
10:04.0	Cameraman	I want to make sure the pilot's comfortable with it.
10:08.6	Cameraman	its three solid clicks.
10:12.5	Pilot	whoa, that is, that did change a little bit.
10:15.5	Cameraman	lets click it down, uh, once.
10:21.1	Pilot	okay that's better.
10:26.7	Pilot	so, uh, @[1]
10:24.7	First Actor	yeah man.
10:25.0	Pilot	when we're taking off…just put it like that.
10:29.0	First Actor	sure brother.
10:30.5	Cameraman	you know we can turn it off once we're airborne.
10:32.8	Pilot	@, @, Shooter One One
10:36.0	Cameraman	uh, we can turn it…
10:37.5	Pilot	we're another one minute out from going one hundred percent here.

The pilot continued to talk to the ground crew about setting up the aircraft's approach for the bag drop. The cameraman interjected during the conversation to the first actor about turning his headlight off. The following conversation occurred,

11:07.4	Cameraman	@, do you want to turn your headset off.
11:09.7	Pilot	pardon me?
11:10.4	Cameraman	should @ turn his headlight off.
11:12.4	Pilot	yeah, turn your headlight off @.
11:13.8	First Actor	got it.

[1] @ denotes a non-pertinent word.

Shortly after this exchange, the helicopter rotations per minute began to increase and the aircraft took off and began to go enroute to the drop zone. At about 12:20, the pilot established communication with ground crew “Wrangler.” The pilot interrupted his communication to comment about a light,

12:33.8	Pilot	okay, I gotta lose that light for right now guys.
12:36.0	First Actor	roger
12:36.6	Pilot	I can’t see.
12:46.0	Pilot	and your headlights gotta go off @.
12:46.9	First Actor	roger.
12:52.6	First Actor	looks like when you key your handset your light comes on. it’s pretty funny.
12:55.6	Pilot	yeah.
12:58.1	First Actor	no worries.
13:00.9	Pilot	Wrangler, Shooter One One, we’re just kinda getting acclimated to the light here.
13:05.4	Ground	copy that Shooter One One, let me know when you’re bringing it in.
13:07.6	Pilot	copy that.

Following this interaction, at about 13:33, the first actor began his scripted dialogue. After the dialogue, the pilot informed ground about setting up for a bag drop. At 14:19.6 the pilot told the first actor “Get ready @.” To which the first actor responded, “Want me to turn the light back on or are we just staying with it off.” The first actor mentioned to the pilot that they were getting close. At 14:45.8, the pilot commented to the first actor, “Okay, you’re going to have to spot me @, because I can’t see.” To which the first actor acknowledged. The pilot then radioed ground informing them it was a dry run and began this interaction,

14:54.2	Pilot	okay, uh, Wrangler, that was just a dry run for us. again I can’t see so, how is our director liking the initial move?
15:05.4	First Actor	that was perfect. he was about twenty-five meters to our left man, a little bit closer and you’re perfect.
15:10.3	Pilot	say again @?
15:11.4	First Actor	he was about twenty-five meters to our left man, it was just, a little bit closer and you’re perfect.
15:19.7	Ground	we would like to rehearse the hover when you can sir.

Following this interaction, the pilot acknowledged the ground’s radio communication and ambient rotor noise followed for 23 seconds, until the first actor began guiding the pilot as to the aircraft’s position. At 16:15.5, the pilot

radioed “Okay. I’m just trying to find the hover here guys, it’s gonna take a minute.” At 16:33.2, the cameraman stated “are you guys in touch with the ground?” To which the pilot responded “Yeah, I am talking to them.” The cameraman followed up with “Can you have ‘em all turn off their headlamps.” The pilot then radioed to Ground about turning off the headlamps; Ground responded at about 16:54 regarding turning the headlight’s off, which began this interaction,

17:22.4	Pilot	okay, I may have to keep moving @. So you may have to just see it and do it. understood?
17:28.1	First Actor	roger that.
17:28.5	Ground	Shooter One One, come in its [unintelligible][2]
17:30.1	Pilot	go ahead.
17:32.9	Ground	are the headlights blinding you or is it possible that we can have em on, on just the picture car.
17:37.2	Pilot	oh the picture car is fine, we just didn’t want to see you guys with the headlights on, your headlights.
17:42.67	Ground	copy that sir, copy that. We’re getting it.

Following this interaction, the pilot, first actor, and ground crew began to set up for the second bag drop. At 18:05.9, the first actor announced “Bag away”. The pilot announced to ground that they were headed back to the landing zone.

Second Bag Drop

The pilot and first actor discussed the bag drop and motion of the bag as it departed the aircraft. At 18:54.2, ground radioed to the pilot “Is it possible that you could slow down instead of just a straight drop, a little bit more of a slow hover overhead.” To which the pilot responded “A-firm. I am just getting acclimated. I cannot see anything and especially the ground that’s underneath me. So uh yeah, we’ll we’ll adjust.” To which ground responded with “Thank you sir.”

Ambient aircraft noise was heard for 15 seconds, when ground reiterated their concerns for a slower hover. At 19:30.6, ground radioed to the pilot “Shooter One One come in.” the pilot responded “Go ahead.” Ground announced “Just to be clear, I know that you are having sight issues, but the goal is a slow hover and then a drop from there.” To which the pilot acknowledged.

Ambient aircraft noise was heard for 37 seconds, when discussion between ground and the pilot began. At about 20:34, the pilot requested to wet down the area on the second attempt. Ground announced to the pilot they are bringing the bag back to the aircraft for the second bag drop attempt. At about

[2] Brackets denote editorial insertion.

21:21, the first actor confirmed he had the bag. As the aircraft prepared for the second bag drop, ground radioed the pilot and the following interaction occurred,

21:29.0	Ground	uh, were you able to see the glowstick X at all?
21:34.9	First Actor	roger yeah I saw the glowsticks in an X, no worries.
21:37.6	Pilot	uh @ saw it, I don't see it, but he sees it.
21:40.3	Pilot	that's the thing is, I can't see anything, so he's gotta walk me through so.
21:45.0	Ground	copy copy.

Following this interaction, the pilot confirmed with the aircraft passengers and ground if they were ready for another go. At about 22:01, the aircraft headed inbound for a second bad drop attempt and the first actor began to read his scripted dialogue. Starting from 22:27.4, and for 57 seconds the pilot and first actor prepared for a bag drop when, at 23:25.0, the pilot announced to the first actor "Hold on, I gotta go around.". At 23:29.9, the pilot told ground, "Okay, just going around, I can't uhh see where the ground is here."

After the go around, the aircraft began a second bag attempt and the first actor guided the pilot by giving visual cues near the bag drop zone. This continued for three minutes. At 26:34.9, the first actor announced "Bag away." After the bag drop the following interaction occurred,

26:44.8	First Actor	this is gonna be tough man. I'm gonna have to release it a lot sooner.
26:47.8	Ground	Shooter One One, request, is it possible to do an even slower hover than that.
26:51.6	Pilot	yeah it's just uh, there's, I have to have a visual cue to see something around me. umm.
26:58.3	Pilot	so that's what I am trying [breathing] to work out here. so uh. each time I do it I am getting slower and slower.

Third Bag Drop

Following this interaction the pilot, first actor, and ground crew discussed how to drop the bag in the center of the target. At about 27:55, the pilot announced he was inbound to the landing zone. While inbound, the pilot radioed to ground and the following interaction occurred,

28:09.6	Pilot	Wrangler, Shooter One One.
28:13.7	Ground	go ahead sir.
28:14.8	Pilot	yeah, there's a couple of vehicles up on the mesa. I don't know if you have contact with them. but if they can turn their headlights on.

		that would give uh me sense of depth perception, and I can see a little bit better.
28:24.6	Pilot	and how did that last run go, we uh rehearsed that and uh @ seems to think that worked pretty good for him.
28:30.4	Ground	the last time you just came by with that nice slow hover, that was exactly what we're looking for.
28:33.7	Pilot	okay. yeah. if I can get those guys to turn their headlights on, on top of that mesa. then I can uh I can see the ground and then I can judge my speed. I have no rate of speed up here.
28:46.3	Ground	copy that I'll have all lights turned on. we don't have any more lights over here sir.

Following this interaction, the aircraft was inbound to the landing zone and the first actor received a call outside of the radio communication. The call appeared to be about the pilot and his performance during the aircraft's hover. The following interaction occurred,

30:02.7	First Actor	okay they are saying that, we have to get to at least a complete stop hover.
30:07.4	Pilot	Well, it won't be a complete stop but, [unintelligible], they just told me what I just, the last move we just did. that was perfect.
30:14.8	First Actor	I just have to time the release to make sure it doesn't keep forward movement, that's, that was my bad.
30:21.8	Pilot	well its tough cause there is no depth perception. You can't see anything.

Following this interaction, ambient aircraft noise is heard, then at 30:50.2, ground radioed the pilot about holding the hover for 8 to 10 seconds. The pilot mentioned that the hover might be a little less than that but he would give it his best shot. Minor discussion followed until about 36:39 when the first actor and pilot discussed how the first actor would give directions to the pilot during the bag drop. The pilot refuted the first actor's plans and stated that the helicopter is not capable of the hover he desired. At 37:16.9, the pilot stated, "The key to the hover is being able to see something."

At about 37:19, ground mentioned they are ready for the aircraft's third bag drop. Minor discussion followed until 38:26.9, when the first actor told the pilot "Hold your hover." To which the pilot responded at 38:29.7 "I can't." At 38:32.1, the first actor announced "Bag away."

Fourth Bag Drop

Following the third bag drop, the pilot and passengers discussed the last bag drop. The aircraft returned to the landing zone and prepared for the fourth bag drop. At about 40:30, the first actor received a call outside of the radio communication. The call appeared to be about the pilot and his performance during the aircraft's hover for the third drop. At 40:48.4, the first actor stated over the call, "We're doing the best we can with what we got right now man, that's as low as he's comfortable flying right now." After this call, the ground announced they are still setting up for the next bag drop.

At 41:58.5, the pilot inquired about who the first actor was speaking with on the production radio. The following conversation occurred,

42:04.7	First Actor	@, one of the, one of the handlers, he was like if you can get lower that would be better, but that's, I am not flying the plane.
42.10.6	Pilot	right, no it's understood, it's just, uhh, I gotta have…
42.15.4	Pilot	well I can give you a whole dissertation on that, I'm not trying to make excuses.
42:18.6	First Actor	no no no. do what you, dude, you're flying the plane. It's your call.
42:23.3	Pilot	but that last run was uh…better, it's just so [unintelligible]
42:31.8	First Actor	you can back up right? if I say back up.
42:35.3	Pilot	…that's a little harder for me to try to do without having better visual cues…because I can start spinning…

Following this interaction, the conversation continued with the pilot mentioning the safety risks by hovering backwards and concluded the conversation with "I can't see enough to hold the hover…"

Minor discussion followed until about 48:10, when the aircraft was inbound for the fourth bag drop. During the bag drop, the first actor guided the pilot and verbalized visual cues near the bag drop zone. At 49:14.7, the first actor announced "Bag away."

Following the fourth bag drop the pilot, passengers, and ground discussed the fourth drop and returned to the landing zone. Once on the ground at about 51:53, the pilot expressed concern about how the maneuvers went. At about

52:35, the pilot briefed the ground crew about safety and thanked them for letting him have numerous takes and not being pushed.

The pilot commented to the actor “You don’t learn this in, uh, helicopter school one oh one, night ops, out of ground effect hover in the dark with no visual cues.”

Additional minor discussions are heard until 55:35.0, when the recording ended.

4.6. Summary of Accident Events Recording Contents

The combined audio and video file that captured the accident contained the accident aircraft departing to a different bag drop location with a different actor replacing the first. The occupants consisted of the same pilot and cameraman, and the different actor. The GoPro was installed on the accident segment and began its recording with the second actor adjusting its position.

While on the ground, the cameraman and second actor set up lights that face the actor during the bag drop. The cameraman discussed with the actor how to manipulate the lights.

While in the air, the aircraft departed towards the drop zone and the impact is shown shortly after the departure. The times of the accident flight are expressed as CDT. The format is MM:SS.n, where MM is minutes, SS is seconds, and n is the frame number (when applicable).

This is a partial transcript of relevant content; the participants are the Pilot, Cameraman, and Second Actor:

On ground

The video began with the second actor and the cameraman setting up. At about 1 minute and 20 seconds into the video, the following conversation began with the second actor and pilot,

1:18.12	Pilot	you may need to lose your uh…headlight too.
1:20.20	Second Actor	can I keep it on red?
1:22.15	Pilot	uhh yeah that’s fine
1:23.16	Pilot	I just can’t have you looking at me.

Following the conversation, the cameraman and second actor continued to set up. At about 2:29, the cameraman, second actor, and pilot had the following conversation regarding the cockpit lights,

2:28.07	Cameraman	hey @.
2:28.20	Pilot	yo.
2:29.14	Cameraman	do you think we can try one click on the LED lights?

2:32.22	Pilot	uhh…
2:35.16	Pilot	we'll see, it just really [sigh] blinds me.
2:39.07	Cameraman	sure.
2:40.00	Cameraman	hey can I just show you something.
2:41.14	Second Actor	yeah.
2:42.19	Cameraman	In front of you is a diaper a little red diaper, see this black box there?
2:46.20	Second Actor	yeah.
2:47.01	Cameraman	on the backside of that is a little red button.
2:50.03	Cameraman	if you click it once…
2:51.03		[click sound]
2:53.14	Second Actor	uh huh.
2:54.13	Cameraman	the light should come on.
2:55.20	Second Actor	[click sound] is that good?
2:57.20	Cameraman	did you click it once?
2:58.19	Second Actor	yeah.
2:59.08	Cameraman	okay, the light should come on, uh, click it again.
3:02.3	Cameraman	feel that red button there?
3:03.08	Second Actor	yeah.
3:04.23	Camerman	oh your battery's dead.
3:07.03	Cameraman	see the red button.
3:10.08	Second Actor	they're on. lightly.
3:12.21	Cameraman	um click them again.
3:15.12		Cockpit and cabin illuminate
3:16.02	Cameraman	uh there we go.
3:16.22	Second Actor	is that good?
3:17.17	Cameraman	pull back.
3:20.10	Cameraman	that's two LED's that's pretty bright.
3:23.11	Cameraman	now um, let's see what @ says.
3:25.20	Pilot	okay I'm cranking.
3:31.00		[sound of rotor spinning up]
3:38.04	Cameraman	now @, just so you know.
3:40.06	Cameraman	that's two more clicks to turn off.
3:42.01	Second Actor	okay.

The sound of the aircraft rotor was predominant until the audio recording began at about 04:45. The cameraman and second actor adjusted their headsets and discussed scripted dialogue for the scene. At 5:39:11, the cameraman said to the second actor just before he read his dialogue "Do it now, while we got light on your face."

Following the scripted dialogue, aircraft ambient noise was heard. The Canon EOS 300PL was turned on and came into view at 06:59.6. A red light

panel was shown resting beneath the windshield on the left side. Scripted Dialogue continued from about 7:12 to 9:13.

At that time, the pilot asked if the cameraman and second actor were good to go. At 9:28:15, the pilot announced to ground before takeoff “Uhh, when I get back, uh, we may have the water truck driver just turn on his headlights. uh, that might be an option…”

In air

The helicopter lifted off at about 10:30. Following liftoff, the second actor continued his scripted dialogue until the pilot intervened; this last conversation was captured,

11:30.15	Pilot	[unintelligible] I need to lose this light, this key light here.
11:32.17	Cameraman	copy that.
11:34.09	Cameraman	two clicks @ and it should go out.
11:42.12	Cameraman	where did uh, we’re going down low.
11:44.17	Pilot	okay, okay, I can’t…
11:46.21	Cameraman	pull up, pull up.
11:47.12		[sound of impact]

The remainder of the recording showed the aircraft at rest.

Attachment I

Cockpit Audio 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.