

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



SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

DCA20LA100

**By
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WARNING

The reader of this report is cautioned that the summary of a cockpit voice recorder audio recording is not a precise science but is the best product possible from an NTSB group investigative effort. 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.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

June 14, 2021

Cockpit Voice Recorder

Specialist's Factual Report
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1. EVENT SUMMARY

Location: Camp Dwyer, Afghanistan
Date: April 20, 2020
Aircraft: Sikorsky S61, Registration N908CH
Operator: CHI Aviation
NTSB Number: DCA20LA100

Refer to the Accident Summary report, within this docket.

2. GROUP

A Group was not convened.

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model: **Universal CVR-120**
Recorder Serial Number: **2087**

3.1 CVR Carriage Requirements

Per federal regulation, multiengine rotorcraft with more than six passenger seats and requiring two pilots manufactured prior to April 7, 2010, and operated under 14 CFR 135, must be equipped with a CVR that records a minimum of the last 30 minutes of aircraft operation. The accident rotorcraft was manufactured in 1977.

3.2 Recorder Description

This model CVR, the Universal CVR-120, is a solid-state CVR that records 120 minutes of digital audio. Specifically, it contains a 2-channel recording of the last 120 minutes of operation and separately contains a 4-channel recording of the last 30 minutes of operation. The 120-minute portion of the recording is comprised of one channel that combines three audio panel sources – captain (CAPT), first officer (FO), and observer – and a second channel that contains the cockpit area microphone (CAM) source. The 30-minute portion of the recording contains 4 channels of audio information: one channel for each flight crew, one channel for the CAM, and one channel for a cockpit observer.

3.3 Recorder Damage

Upon arrival at the laboratory, it was evident that the CVR had not sustained any water, heat, or structural damage and the audio information was extracted from the recorder normally, without difficulty.

3.4 Audio Recording Description

Each channel's audio quality¹ is indicated in Table 1. Channel number one did not contain any crew audio information (nor was it required by federal regulations).

Table 1: Audio Quality.

Channel Number	Content/Source	Quality	Duration
1	Other	Excellent	30 min
2	FO	Excellent	30 min
3	CAPT	Excellent	30 min
4	CAM	Poor	30 min
5	Combined	Good	2 hr
6	CAM	Poor	2 hr

The audio quality of channel number four, the CAM channel, was generally poor during flight due to high level wideband noise masking most other sounds.

3.5 Timing and Correlation

Timing on the summary during the accident flight portion of the recording was established by correlating the CVR events to common events on an Appareo Vision 1000 recovered from the helicopter after the accident. Time is correlated with a nominal 1 s precision and expressed in coordinated universal time (UTC).

3.6 Description of Audio Events

The recording began at an unknown time with the aircraft in-flight during a previous flight. Approximately 8-minutes, 43-seconds after the beginning of the recording the CVR recorded sounds consistent with a power transition; typical of aircraft power being shut down and later re-applied. No timing correlation was attempted for this portion of the summary, and all entries before this time are all expressed in elapsed time from the beginning of the recording.

The summary for the accident flight began immediately after this point in the CVR recording, at 0135:16 UTC with sounds consistent with engine start. A summary of the entire CVR recording follows concentrating on information related to aircraft flight operations and maintenance issues. Audible events are characterized and summarized in transcript format up to the time 0332:13 UTC, at which time the recording ended.

¹ See attached CVR Quality Rating Scale.

Attachment I

CVR Quality Rating Scale

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

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

Transcript of a Universal CVR-120 solid-state cockpit voice recorder, serial number 2087, installed on a Sikorsky S61 (N908CH), which crashed upon landing at Camp Dwyer, Afghanistan on April 20, 2020.

LEGEND

CAM	Cockpit Area Microphone
HOT	Hot Microphone
RDO	Radio
TWR	Tower
-1	Voice identified as a pilot for a previous flight
-2	Voice identified as a pilot for a previous flight
-3	Voice identified as the left seat pilot
-4	Voice identified as the right seat pilot
-?	Voice unidentified
*	Unintelligible word
#	Expletive
@	Non-pertinent word
()	Questionable insertion
[]	Editorial insertion

Note 1: Times for the accident flight are expressed in Coordinated Universal Time (UTC). Times for the previous flight are in elapsed time from the beginning of the recording.

Note 2: Generally, only radio transmissions to and from the incident aircraft are 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	Time and Source	Over-the-Air Communication
0000:00 (elapsed)	START OF RECORDING		
0003:03 (elapsed)	CAM [sounds consistent with aircraft in-flight].		
0001:00 (elapsed)	HOT-1 * * C S be ready to go.		
0001:44 (elapsed)	HOT-1 * * * * (M) C S comin' up * * * *		
0003:54 (elapsed)	HOT [unintelligible conversation].		
0004:15 (elapsed)	HOT-1 seems to be driving straight.		
0004:51 (elapsed)	HOT-2 so, somethings definitely up with the pedals, that's for sure.		
0005:01 (elapsed)	HOT-? * * * brakes * radar * * sorry * * * * gonna go with it * * * be one with the aircraft * * *.		
0005:32 (elapsed)	HOT [sounds consistent with landing]. * * * brakes, brakes set. * * * parking brakes set.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
0007:09 (elapsed) CAM	[sounds consistent with engine shutdown].		
0007:41 (elapsed) HOT-1	* * * flight * anything?		
0007:43 (elapsed) HOT-2	nope, you got anything?		
0007:44 (elapsed) HOT-1	*		
0007:45 (elapsed) HOT-2	sure you don't anything?		
0007:46 (elapsed) HOT-1	* *		
0007:47 (elapsed) HOT-2	no? alright. brakes. pedals.		
0007:53 (elapsed) HOT-1	*		
0007:55 (elapsed) HOT-2	that's it that left brake's really, really mushy.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
0007:88 (elapsed) HOT-1	oh yeah that thing, anything else for the checklist?		
0008:35 (elapsed) HOT	[sounds consistent with after shutdown checklist].		
0008:39 (elapsed) HOT-2	alrighty, there's everything.		
0008:43 (elapsed) HOT	[sounds consistent with multiple power transitions].		
0135:16	START OF ACCIDENT FLIGHT		
0135:16 CAM	[sounds consistent with engine start].		
0135:27 HOT-4	alright this is where we got- this is where we got to last time.		
0135:29 HOT-3	yup.		
0135:30 HOT-3	so far, so good.		
0135:32 HOT	[sounds consistent with checklist usage].		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
0136:42 HOT-4	which is crazy because that's not the one's been stickin', its been this one's been stickin'.		
0136:46 HOT-4	ah huh. master caution reset.		
0136:49 HOT-4	ah, master caution reset, master start you mean?		
0136:51 HOT-3	yeah sorry, master start.		
0136:52 HOT-4	yeah.		
0138:27 HOT	[conversation consistent with programming of the navigation system].		
0138:45 HOT	[sounds consistent with ATIS information Echo].		
0140:13 HOT	[sounds consistent with checklist usage].		
0142:20 HOT-3	yeah this guy'll work for about five to ten minutes and then it * * * circuit breaker pops over there, yeah.		
0142:22 HOT-4	shu- shuts itself off, yeah.		
0142:33 HOT-4	well, unfortunately we can't write that up. * * we're dead in the water for one thirty five ops.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
0142:37 HOT-3	yup.		
0142:39 HOT	[conversation related to unspecified system].		
0143:24 HOT	[sounds consistent with checklist usage].		
0144:07 HOT	[conversation consistent with routine helicopter operation].		
0146:31 HOT	[sounds consistent with checklist usage].		
0148:05 HOT	[sounds consistent with pilot window being closed].		
0148:59 HOT-3	* * parking brake's released *.		
0149:07 HOT	[conversation concerning consistent failure of left brake on this aircraft].		
0149:50 HOT	[sounds consistent with checklist usage].		
0150:46 HOT-3	alright controls. alright controls are good. pressures and temps are good. no caution waring lights. happy bird.		
0151:04 HOT-3	before landing's good.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
0153:19 HOT	[radio calls with ground operations and crew discussion concerning passengers and cargo to be unloaded. Comments concerning passengers going to Camp Dwyer].		
0158:13 HOT-3	alright airspeeds alive. climb is comin' in.		
		0200:30 RDO	[Wolverine 07 call contacted departure while climbing through 4000 and cleared VFR].
0214:31 HOT	[discussion concerning flight times and crew rest].		
		0233:31 RDO	[frequency exchange. instructed to report at 5-miles].
0246:15 HOT	[checklist items].		
0250:28 HOT	[discussion concerning cargo].		
0251:14 HOT-4	alright before landing still looks good.		
0252:24 HOT	[flight operations discussion].		
		0255:52 RDO	[Wolverine 07 request to reposition].
0258:03 HOT-3	[discussion concerning cargo/load].		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
0259:28 HOT	[change of aircraft control so right seat pilot could fly the mid-route].		
0300:10 HOT-4	brakes.		
		0300:11 RDO	[Wolverine 07 cleared for departure; instructed to report at five miles].
0301:01 HOT	[crew discussion consistent with liftoff and climb-out].		
0302:28 HOT-4	one fourteen.		
0302:30 HOT-3	roger.		
0302:39 HOT-3	I'll take a little bit more friction.		
0302:41 HOT-4	there ya go.		
		0304:05 RDO-4	shore patrol Wolverine zero seven inflight we are cleared to the southwest * (change).
0310:15 HOT	[metallic sound].		
0313:04 HOT-4	one two.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
0313:05 HOT-3	one two.		
0316:13 HOT-4	Dwyer's in- in sight.		
0316:16 HOT-3	roger.		
0316:17 HOT-4	see it?		
0316:18 HOT-3	yeah.		
		0317:49 RDO-4	* tower Wolverine zero seven.
		0317:55 TWR	Wolverine zero seven * * good morning * * * calm altimeters two niner niner seven, report one five miles.
0321:44 HOT	[nearby traffic called out to Wolverine 07].		
0322:59 HOT	[discussion concerning fuel truck availability]		
0324:12 HOT	[Wolverine 07 spotted and reported nearby traffic in-sight]		
0327:09 HOT-4	[before landing checklist run and completed].		
		0328:37 RDO-4	[Wolverine 07 reported in and received clearance to land].

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
0329:53 HOT	[nearby traffic reported to Wolverine 07 and spotted by crew].		
0331:10 HOT-3	nobody's at the range today. not on the big one anyway. maybe on the little one.		
0331:22 HOT-4	ah, looks like he's shootin'.		
0331:25 HOT-4	* *.		
0331:25 HOT-3	oh yeah now I see him.		
0331:33 HOT-3	couldn't see him there for a second.		
0331:49 CAM	[slight change in background noise].		
0331:57 HOT	*.		
0331:58 CAM	[change in engine / rotor sounds].		
0332:00 CAM	[sound of click].		
0332:00 HOT-3	alright do you have controls?		
0332:03 HOT-3	let's get this down on the ground.		

Time and
Source

Intra-Aircraft Communication

Time and
Source

Over-the-Air Communication

0332:06

HOT [sound of momentary beep].

0332:10

END OF RECORDING