

National Transportation Safety Board

Office of Research and Engineering

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COCKPIT VOICE RECORDER

Specialist's Factual Report

July 25, 2024

WARNING

The reader of this report is cautioned that the summary and transcript of a cockpit voice recorder audio recording is not a precise science but is the best product possible from a National Transportation Safety Board group investigative effort. The summary and transcript or parts thereof, if taken out of context, could be misleading. The summary and 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 summary and transcript as the sole source of information.

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A. ACCIDENT

Location: San Marcos, TX
Date: January 2, 2024
Time: 1710 central standard time (CST)
Airplane: Learjet 35, N46MF

B. COCKPIT VOICE RECORDER SPECIALIST

Specialist Olivia Fowler
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C. FEDERAL CARRIAGE REQUIREMENTS

The event aircraft, N46MF, was operating under Title 14 *Code of Federal Regulations* (CFR) Part 135. The event aircraft was manufactured in 1981 and was operating such that it was required to be equipped with a cockpit voice recorder (CVR) that records a minimum of the last 30 minutes of aircraft operation.

D. DETAILS OF THE INVESTIGATION

A CVR group was not convened. The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model: Universal CVR-30
Part Number: 1601-02-3
Recorder Serial Number: 6469

1.0 Recorder Description

This model CVR, the Universal CVR-30, records a minimum of 30 minutes of digital audio stored on solid state memory modules. Four channels are recorded: one channel for each flight crew, one channel for a cockpit observer, and one channel for the cockpit area microphone (CAM).

1.1 Recorder Damage

Upon arrival at the 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.

1.2 Audio Recording Description

Each channel's audio quality is indicated in Table 1.¹ Channel number one did not contain any usable audio information (nor was it required by federal regulations). Channel number four contained 18 seconds of usable audio.

Table 1. Audio quality

Channel Number	Content/Source	Quality	Duration (mm:ss)
1	Observer	Unusable	30:01
2	Co-pilot	Fair	30:01
3	Pilot	Poor	30:01
4	CAM	Unusable	30:01

1.3 Timing and Correlation

Timing on the transcript was established by correlating fifteen transmission times from air traffic control (ATC) recordings to the corresponding CVR events. CVR events were offset to reflect the local central standard time (CST) of the accident.

1.4 Description of Audio Events

Party members were invited to a CVR group but all declined to attend, therefore a CVR group did not convene. The recording started at 16:54:19 CST. The recording was transcribed from the beginning of the recording when the aircraft was on approach through the aircraft coming to a halt after exiting the runway (about 14 minutes). The transcript is attached in Appendix B.

Summary of events after the transcript:

At 17:10:55 the tower said that rescue crews were enroute. Sounds were noted of people moving around in the flight deck and cabin, and unidentifiable persons checked in with each other saying, "we're good."

The captain mentioned the air traffic control ground frequency, however, whether he actually changed frequencies or continued talking to tower was undetermined. At 17:12:14, the controller asked how many people were onboard. The captain responded that there were "five and we're all okay."

At 17:14:47 the crew opened the aircraft door.

Radio transmissions indicate that other aircraft were landing on runway 35 (which nearly opposes runway 13 where the subject aircraft landed). Unintelligible background conversation between several unidentified voices was noted. The

¹ Appendix A comprises the CVR Quality Rating Scale.

captain was noted observing, "I saw two lights, I wasn't sure what they were. And then when you said runway in sight, we were— we were too high, shoulda gone around."

At 17:18:33, a crew member was noted talking on speaker phone. The conversation was partially unintelligible due to overlapping radio transmissions. The crew member noted, "it was a lot lower than it said and I was too high and shoulda gone around but I didn't, and the runway's short and it's wet so I couldn't really stop and...so I couldn't really stop on the runway. So, I went to the side to avoid the uh the ILS antenna." Later in the call he referred to the ceiling saying, "it said eleven hundred but when we got down it was lower than that."

At 17:23:13, ATC reported winds from 340 degrees at 10 knots. This was the first time that the winds were reported by ATC during this recording.

The recording ended at 17:27:05.

Submitted by:

Olivia Fowler
Mechanical Engineer - Recorder Specialist

APPENDIX A. 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.

APPENDIX B. CVR TRANSCRIPT

The following is a transcript of a Universal CVR-30 solid state cockpit voice recorder, serial number 6469, installed on a Learjet 35, N46MF, Operated by Med Flight Air Ambulance Inc, which had a runway excursion during landing on January 2, 2024 at San Marcos Regional Airport (KHYI) in San Marcos, TX.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
RDO	Radio transmissions from N46MF
ZHU	Radio transmission from Houston Center controller
APP	Radio transmission from the KHYI approach controller
TWR	Radio transmission from the KHYI airport tower controller
ATC	Radio transmission from unknown controller at KHYI airport
ATIS	Automated Terminal Information Service for KHYI Airport
-1	Voice identified as the pilot
-2	Voice identified as the co-pilot
-?	Voice unidentified
*	Unintelligible word
#	Expletive
@	Non-pertinent word
()	Questionable insertion
[]	Editorial insertion

Note 1: Times are expressed in central standard time.

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	Time and Source	Over-the-Air Communication
16:54:19.3	START OF RECORDING		
	START OF TRANSCRIPT		
16:57:01.1	* *_ *		
		16:57:37.0 ZHU	medevac four six mike fox descend and maintain seven thousand the Austin altimeter three zero zero three.
		16:57:41.3 RDO-2	three zero zero three descend and maintain seven thousand medevac four six mike fox.
16:57:50.1			
HOT-2	*		
16:58:02.3			
HOT-1	(aaand/issss) thirty two hundred so we're still well above *		
16:58:08.4			
HOT-2	looks good *		
16:58:10.5			
HOT-2	right.		
16:58:13.1			
CAM	[unidentified 465 Hz tone lasting for 2 seconds]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		16:58:23.0 ZHU	november nine zero four juliet * execute the missed approach * climb and maintain six thousand.
16:58:27.8 HOT-1	uh oh.		
16:59:05.7 HOT-1	where was that missed?		
16:59:07.8 HOT-2	Horseshoe Bay.		
16:59:36.2 HOT-2	yeah we're past Horseshoe Bay.		
16:59:38.5 HOT-1	oh that's the one where he missed.		
16:59:40.1 HOT-2	yeah.		
16:59:42.4 HOT-2	yeah they're...they're at like our seven or eight o'clock right now.		
16:59:46.4 HOT-1	how far?		
16:59:48.0 HOT-2	Uh...twenty miles.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
17:00:02.7 HOT-1	eh see if there's another A-TIS.		
		17:00:08.6 ATIS	taxiway bravo closed south of eight two six hazardous weather information center weather advisory number one zero two in effect for further weather information contact flight service advise on initial contact you have information delta. San Marcos Regional Airport A-TIS information delta time two two zero zero zulu * weather wind zero six zero at eight visibility one zero thunderstorms in the vicinity light rain sky condition ceiling overcast one thousand three hundred–
17:00:23.3 HOT-1	still delta.		
17:00:24.4 HOT-2	yep.		
17:00:40.0 HOT-1	eh still says it's * good.		
17:00:43.3 HOT-2	yep.		
17:00:43.9 HOT-1	okay we got rain...we got the uh anti-ice on.		
17:00:47.3 HOT-1	all right.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
17:00:51.8 HOT-2	aand we got windshield heat.		
17:00:53.6 HOT-?	[unintelligible mumble]		
		17:01:05.9 ZHU	medevac four six mike fox contact uh...contact * * one niner point zero.
		17:01:11.3 RDO-2	nine * point zero medevac six mike fox see ya.
17:01:13.6 ZHU	*.		
17:01:15.0 HOT-1	three thousand 'til established turn right at the uh * * and once you've cleared the R-NAV *—		
17:01:21.6 CAM	[sound of thumping/clicking]		
		17:01:24.1 RDO-2	Austin Approach medevac four six mike foxtrot ten thousand two hundred descending seven thousand with delta.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		17:01:30.5 APP	medevac uh four six mike foxtrot Austin Approach information delta is current and uh did you want the R-NAV eight or the R-NAV three five?
17:01:37.5 HOT-1	I-L-S.		
		17:01:38.8 RDO-2	we'd like the I-L-S if we can get it for one three for medevac six mike fox.
		17:01:44.7 APP	roger I do have traffic on the uh runway three five so standby for that.
		17:01:48.8 RDO-2	thank you.
17:01:51.4 HOT-1	that'll get us more room there's not much wind.		
17:02:28.6 HOT-1	and L-NAV–		
		17:02:29.1 APP	november er uh medevac four six mike foxtrot fly heading of uh let's go one zero zero join the localizer runway one three at San Marcos and uh descend and maintain three thousand.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		17:02:41.0 RDO-2	descend and maintain three thousand heading one zero zero for the localizer for one three medevac four six mike fox.
17:02:46.5 HOT-1	you want it three thousand when I activate the approach?		
17:03:01.0 HOT-2	(you're not on this approach).		
17:03:17.2 HOT-1	GARYS. [referring to GPS waypoint]		
17:03:28.5 HOT-1	okay localizer's alive.		
17:03:53.8 HOT-1	not turning to intercept too well.		
17:03:56.8 HOT-2	oh.		
17:03:59.4 HOT-1	uh it's getting over there eventually.		
17:04:08.5 HOT-1	we gotta go down to sssix– three thousand.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		17:04:10.7 APP	and november uh– medevac four six mike foxtrot maintain three thousand are you gonna be able to make that descent?
17:04:15.9 HOT-1	yes.		
		17:04:17.1 RDO-2	yes sir we will maintain three thousand medevac six mike fox.
17:04:19.4 HOT-1	flaps eight.		
17:04:21.7 HOT-2	all right flaps eight.		
17:04:22.8 HOT-1	*.		
17:04:32.0 HOT-2	re-intercept the localizer.	17:04:20.0 APP	roger.
17:04:34.7 HOT-1	yep.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
17:04:39.8 HOT-1	*** gear– gear down **.		
17:04:44.1 CAM	[increase in ambient noise consistent with gear deployment]		
17:04:50.4 HOT-1	we're pretty much on the uh...		
17:04:54.5 CAM	[sound of latch/lever]		
		17:05:06.4 APP	medevac four six mike foxtrot are you seven miles from GARYS maintain three thousand 'til established on the localizer cleared I-L-S runway one three no descent (restrictions).
17:05:16.0 HOT-1	go ahead.		
		17:05:16.4 RDO-2	* maintain three thousand and cleared I-L-S one three for San Marcos medevac four six mike foxtrot.
17:05:25.4 HOT-2	here we go now the localizer's coming back in.		
17:05:31.4 HOT-1	yeah but it's not– it's not really tracking.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
17:05:35.1 HOT-2	yeah I wouldn't trust the autopilot.		
17:05:45.5 CAM	[sound of five dings at 2900 Hz]		
17:05:46.6 HOT-2	one to go.		
17:05:47.8 HOT-1	okay flaps twenty.		
17:05:49.5 HOT-2	flaps twenty.		
17:05:50.5 HOT-1	gear down before landing check.		
17:05:51.8 HOT-2	gear's down.		
		17:05:55.6 APP	medevac four six mike foxtrot remain on your code and contact San Marcos Tower.
		17:06:00.4 RDO-2	stay on the code and over to tower medevac six mike fox.
17:06:04.3 HOT-2	twenty six eight two five.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		17:06:21.1 RDO-2	tower medevac four six mike foxtrot I-L-S (for/one) runway one three.
		17:06:25.6 TWR	medevac four six mike foxtrot San Marcos Tower continue inbound for one three I'll give you landing clearance in just a couple more miles.
		17:06:32.2 RDO-2	all right we'll continue inbound medevac six mike fox.
17:06:34.5 HOT-1	okay before landing check.		
17:06:35.9 HOT-2	all right before landing spoilers are retracted...lights out...flaps are twenty...landing gear down three green no red...hydraulic * air is good. thrust reversers don't have...anti-skid is on. landing lights are (on/off)...engine sync is off...air ignition is on...flaps are twenty...autopilot disengage...yaw damper to go.		
17:07:02.4 HOT-2	before landing complete with full flaps and yaw damper.		
17:07:09.9 HOT-2	we're one mile from GARYS final approach fix.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
17:07:24.0 HOT-2	I'm seeing ground.		
17:07:37.1 CAM	[sound of five dings at 2900 Hz]		
17:07:41.6 HOT-2	bring it up to three thousand.		
17:07:44.3 HOT-1	yeah I'm on the uh glideslope.		
		17:07:53.2 TWR	medevac four six mike foxtrot runway one three cleared to land.
		17:07:56.7 RDO-2	one three clear to land medevac six mike fox.
17:07:58.7 HOT-1	okay flaps...* *.		
17:08:10.3 HOT-1	flaps full.		
17:08:11.8 HOT-2	all right flaps are full yaw dampers away before landing is complete.		
17:08:23.1 HOT-2	we're going down to...eight.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
17:08:41.6 CAM	[sound of five dings at 2900 Hz]		
17:08:42.6 HOT-2	thousand to go.		
17:08:45.2 HOT-2	we're just right on the edge of– I can see green...there it is.		
17:09:04.0 HOT-2	still looking for a runway.		
17:09:21.2 HOT-2	three hundred to go.		
17:09:33.3 HOT-2	I see PAPIs.		
17:09:36.3 HOT-2	all right there we go landing is assured straight ahead twelve o'clock. do you see PAPIs on the left?		
17:09:43.7 HOT-1	uh I don't see–		
17:09:44.6 HOT-2	right there straight down look down.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
17:09:47.0 HOT-1	oh there we go.		
17:09:47.7 HOT-2	yeah. we need to– still two hundred feet to go.		
17:10:02.9 CAM	[sound of five dings at 2900 Hz]		
		17:10:03.6 TWR	not much runway left.
		17:10:07.2 ?	**.
17:10:08.8 CAM	[sounds consistent with touchdown]		
17:10:16.0 HOT-1	# we're goin' off.		
17:10:19.2 HOT-2	we are.		
17:10:22.5 HOT-2	#.		
17:10:22.9 CAM	[rattling sounds consistent with departure from paved surface]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
17:10:29.2 CAM	[rattling sounds stop]		
17:10:29.3 CAM	[sound of five dings at 2900 Hz]		
17:10:30.8 HOT-1	hello.		
17:10:33.1 HOT-1	negative we're off the runway.		
17:10:36.6 CAM	[sounds of clicks]		
17:10:41.7 HOT-1	kill the power.		
17:10:41.7 END OF TRANSCRIPT			
17:27:05.4 END OF RECORDING			