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

GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

ERA21LA083

By
Michael Portman

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

August 10, 2021

Cockpit Voice Recorder

Group Chairman's Factual Report
By Michael Portman

1. EVENT SUMMARY

Location:	Farmingdale, New York
Date:	December 20, 2020
Aircraft:	Hawker 800XP, Registration N412JA
Operator:	Talon Air Jets
NTSB Number:	ERA21LA083

A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for evaluation. The CVR group meeting convened on March 16, 2021, and a summary and partial transcript was prepared for the 31-minute, 20-second digital recording (see attached).

2. GROUP

Chairman:	Michael Portman Aerospace Engineer (Recorder Specialist) National Transportation Safety Board
Member:	Katherine Adrada Aviation Safety Inspector – Operations Farmingdale FSDO, EA-11 Federal Aviation Administration
Member:	Raymond Marciano Captain Talon Air Jets

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model:	**Universal CVR-30B**
Recorder Serial Number:	**1393**

3.1 CVR Carriage Requirements

Per federal regulation, turbine multiengine aircraft with more than six passenger seats and requiring two pilots manufactured prior to April 7, 2010, and operated under 14 *Code of Federal Regulations* 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 2001. 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 Universal CVR-30B, 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).

3.3 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.

3.4 Audio Recording Description

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

Table 1: Audio Quality.

Channel Number	Content/Source	Quality	Duration
1	Observer	N/A	N/A
2	Captain	Excellent	00:30:12
3	First Officer	Excellent	00:30:12
4	CAM	Good	00:31:20

3.5 Timing and Correlation

Timing on the summary and transcript was established by correlating the air traffic control (ATC) recording transmission time to the corresponding CVR event. Specifically, the CVR time of the check-in radio transmission from N412JA to Republic tower was linked to the corresponding ATC local time, and all CVR events were offset to reflect the local eastern standard time (EST) of the accident. Of note, the ATC transmission summary was accurate to the nearest minute, therefore the timing of this report is ±1 minute from the actual time.

3.6 Description of Audio Events

In agreement with the Investigator-In-Charge, the CVR group convened to transcribe approximately 7 minutes of recorded audio before the accident. The remainder of the recording was summarized by the recorder specialist. The recording and summary began at 2012:50 while the aircraft was descending toward the New York metro area. The transcript began at 2027:51 and continued until 2035:42. Touchdown occurred at approximately 2035:27. The recording ended at 2044:20.

[1] See attached CVR Quality Rating Scale.

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. They have not responded to the invitation.

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-30B solid-state cockpit voice recorder, serial number 1393, installed on a Talon Air Jets Hawker 800XP (N412JA), which crashed at Republic Airport in Farmingdale, New York.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
RDO	Radio transmissions from N412JA
APR	Radio transmission from the New York approach controller
TWR	Radio transmission from the Republic airport tower controller
-1	Voice identified as the captain
-2	Voice identified as the first officer
-?	Voice unidentified
*	Unintelligible word
#	Expletive
@	Non-pertinent word
( )	Questionable insertion
[ ]	Editorial insertion

Note 1: Times are expressed in eastern standard time (EST).

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
20:12:50.0 **START OF RECORDING** **START OF SUMMARY**			
20:14:28.4	[the aircraft was instructed to cross 20 miles southwest of the SARDI intersection at 9,000 feet (ft)]		
20:15:24.0	[the crew conducted approach planning and briefing including the following items: Islip airport showed more favorable conditions, Teterboro airport as alternate, the aircraft had decent amount of fuel, the crew would plan to shoot the approach and then go alternate, and the crew discussed if the tower was closed]		
20:16:18.7	[the crew briefed a go-around, planned on flying the published missed approach, and discussed that the go-around call would be "go around, go around, thrust, flaps 15, positive rate gear up, FMS NAV FLCH"]		
20:16:33.7	[the crew were instructed to contact Boston center]		
20:16:41.4	[the crew discussed minimums]		
20:16:58.5	[the crew checked in with Boston center]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:18:22.6	[the crew obtained the Republic airport ATIS, information X-Ray, published at 0053Z, which included winds from 40 degrees at 3 knots, visibility of ¾ mile with mist, cloud ceiling of 200 ft overcast, temperature 1 degree Celsius, dewpoint 0 degrees Celsius, altimeter setting of 30.04 inches of Mercury, and a runway condition code of 5-5-5, 100% wet]		
20:18:23.6	[the crew received an altitude alert]		
20:18:43.6	[the crew were cleared to descend and maintain 7,000 ft and fly direct to Calverton]		
20:19:38.3	[the crew were instructed to contact New York approach]		
20:19:50.3	[the crew selected de-ice on]		
20:19:58.3	[the crew checked in with New York approach, descending to 7,000 ft and were cleared to descend to 4,000 ft]		
20:20:14.1	[the crew were cleared to fly direct to Deer Park]		
20:21:02.4	[the crew selected anti-ice off]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:22:44.9	[the crew were cleared to descend to 3,000 ft and were instructed to contact another approach controller]		
20:23:24.3	[the crew checked in with approach and were told to expect vectors for the ILS runway 14]		
20:23:40.5	[the crew set up and briefed the approach]		
20:25:37.3	[the crew ran an approach checklist including confirming a reference approach speed (V_{ref}) of 117 knots, and a go-around speed of (unclear) 122 or 127 knots]		
20:26:48.8	[the crew were cleared to turn left to a heading of 320 degrees]		
20:27:29.8	[the crew were cleared to descend and maintain 2,000 ft]		
START OF TRANSCRIPT			
20:27:51.1 **CAM**	twenty five hundred. [electronic voice]		
20:28:13.7 **HOT-2**	(uh) two?		
20:28:14.3 **HOT-1**	two.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:28:19.0 **CAM**	[sound consistent with altitude alert]		
20:28:30.6 **HOT-2**	altitude capture.		
20:28:32.2 **CAM**	[sound consistent with altitude alert]		
		20:29:26.8 **APR**	Talon flight nine forty one turn left heading two five zero.
		20:29:29.8 **RDO-1**	left turn heading two five zero Talon flight nine forty one.
20:29:34.4 **HOT-2**	go flaps fifteen.		
20:29:36.4 **HOT-1**	speed checks.		
20:29:43.0 **HOT-1**	selected.		
20:29:47.2 **HOT-1**	indicated.		
20:31:28.0 **HOT-1**	they forgot about us.		
20:31:30.9 **HOT-2**	yep.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		20:31:32.1 **APR**	Talon flight nine forty one four miles from FRIKK turn left heading one seven zero maintain one thousand six hundred until established on the localizer (cleared I-L-S/cross) runway one four approach.
		20:31:39.8 **RDO-1**	left turn now one seven zero one thousand six hundred 'till established cleared the I-L-S one four approach Talon flight nine forty one.
20:31:45.1 **HOT-2**	sixteen hundred.		
20:31:53.1 **CAM**	[sound consistent with altitude alert]		
20:32:05.6 **HOT-2**	we're cleared for the approach right?		
20:32:07.0 **HOT-1**	affirmative.		
20:32:15.7 **HOT-1**	captured.		
20:32:17.2 **HOT-2**	that's uh—		
		20:32:22.0 **APR**	Talon flight nine forty one contact Republic tower one one eight point eight.
		20:32:25.4 **RDO-1**	eighteen eight Talon flight nine forty one we'll see ya.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:32:33.7 **HOT-2**	gear down before landing checklist.		
20:32:36.6 **CAM**	[sound of lever]		
20:32:36.7 **CAM**	[increase in ambient noise consistent with gear down]		
		20:32:37.8 **RDO-1**	Republic tower hello Talon flight nine forty one established I-L-S runway one four outside of FRIKK.
		20:32:43.4 **TWR**	Talon flight nine forty one Republic tower wind calm runway one four cleared to land last aircraft uh about five minutes ago reported mins uh bases right at the mins.
		20:32:53.5 **RDO-1**	all right cleared to land uh thanks for the PIREP Talon flight nine forty one.
20:32:56.7 **HOT-2**	flaps twenty five.		
20:32:58.0 **HOT-1**	speed check.		
20:32:59.2 **HOT-1**	there's glide slope.		
		20:32:59.6 **TWR**	uh new weather's comin' out looks like visibility has dropped a little bit to one quarter and uh fog indefinite ceiling two hundred temperature one dewpoint minus one altimeter three zero zero three.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:33:07.6 **HOT-?**	[sound of breathing]		
20:33:11.8 **HOT-2**	uh.		
		20:33:12.0 **RDO-1**	understood Talon flight nine forty one.
20:33:13.1 **HOT-1**	all right we're part ninety one we're inside the fix.		
20:33:13.5 **HOT-2**	so...full flaps— exactly.		
20:33:15.6 **HOT-1**	(will/we'll) continue.		
20:33:16.5 **HOT-2**	I was gonna say the same.		
20:33:18.0 **HOT-1**	full flaps.		
20:33:21.7 **HOT-2**	but we will be ready to go.		
20:33:23.2 **HOT-1**	yep.		
20:33:28.2 **HOT-1**	I wanna keep the lights where they are so they they don't...blind you.		
20:33:30.4 **CAM**	[sound consistent with altitude alert]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:33:30.5 **HOT-2**	that's fine.		
20:33:33.1 **HOT-2**	I'm inside you're outside.		
20:33:34.8 **HOT-1**	yep.		
20:33:35.7 **HOT-1**	landing gear's down three green pin pressure three thousand nosewheel steering is clear engine sync is off...A-P-R is armed and…you have a thousand feet 'til mins...ignitions auto altimeter set flaps full main air's closed autopilot yaw damp to go.		
20:33:41.7 **CAM**	one thousand. [electronic voice]		
20:34:18.9 **HOT-1**	five hundred.		
20:34:22.1 **HOT-2**	check.		
20:34:25.4 **HOT-1**	four hundred.		
20:34:27.6 **CAM**	four hundred. [electronic voice]		
20:34:32.9 **HOT-1**	three hundred.		
20:34:40.3 **CAM**	[sound of ping]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:34:43.2 **CAM**	three hundred. [electronic voice]		
20:34:43.9 **HOT-1**	two hundred.		
20:34:51.7 **HOT-1**	one hundred.		
20:34:56.1 **HOT-1**	all right I got lights.		
20:34:56.3 **CAM**	minimums. [electronic voice]		
20:34:57.8 **HOT-2**	continuing.		
20:35:01.1 **HOT-1**	there are the rabbits do you see ‘em?		
20:35:03.0 **HOT-1**	red terminating bar lights.		
20:35:03.3 **HOT-2**	landing.		
20:35:07.1 **CAM**	one hundred. [electronic voice]		
20:35:08.3 **HOT-1**	there's the runway.		
20:35:10.7 **HOT-2**	give me lights.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:35:11.5 **CAM**	[sound consistent with autopilot disconnect]		
20:35:12.3 **CAM**	fifty. [electronic voice]		
20:35:12.4 **CAM**	[sounds consistent with reduction in engine power and airspeed]		
20:35:13.8 **CAM**	forty. [electronic voice]		
20:35:15.7 **CAM**	thirty. [electronic voice]		
20:35:16.7 **HOT-1**	flare flare flare.		
20:35:17.0 **CAM**	[unidentified electronic buzzing sound]		
20:35:18.1 **HOT-1**	to the left to the left you're slidin'.		
20:35:18.1 **CAM**	twenty. [electronic voice]		
20:35:21.0 **HOT-2**	take it take it.		
20:35:21.0 **HOT-1**	go around go around go around.		
20:35:22.5 **HOT-2**	go around go around thrust flaps fifteen.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
20:35:24.7 **CAM**	[sound of click]		
20:35:24.7 **CAM**	ten. [electronic voice]		
20:35:25.5 **CAM**	[faint sounds of mechanical ticking]		
20:35:25.6 **CAM**	[sound of click]		
20:35:27.3 **CAM**	[sounds consistent with impact]		
20:35:41.5 **CAM**	[sound of gear/flap disagree warning, continues throughout recording]		
END OF TRANSCRIPT			
20:36:52.0 **summary**	[the crew communicated with Republic tower and first responders throughout the remainder of the recording]		
20:44:19.7 **END OF RECORDING**			