

**NATIONAL TRANSPORTATION SAFETY BOARD**  
Vehicle Recorder Division  
Washington, DC 20594

May 14, 2014

## **Cockpit Voice Recorder**

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

### **1. EVENT**

Location: Branson, Missouri  
Date: January 12, 2014  
Aircraft: Boeing 737-700, N272WN  
Operator: Southwest Airlines, Flight 4013  
NTSB Number: DCA14IA037

### **2. GROUP**

A group was not convened.

### **3. SUMMARY**

On January 12, 2014, about 1810 local time, Southwest Airlines flight 4013, a Boeing 737-7H4, registration N272WN, mistakenly landed at M. Graham Clark Downtown Airport (PLK), Branson, Missouri, which was 6 miles north of the intended destination, Branson Airport (BBG), Branson, Missouri. The flight had been cleared to land on runway 14 at BBG, which was 7,140 feet long, however, landed on runway 12 at PLK, which was 3,738 feet long. There were no injuries to the 124 passengers and 7 crewmembers and the aircraft was not damaged. The aircraft was being operated under the provisions of 14 *Code of Federal Regulations* (CFR) Part 121 as a regularly scheduled passenger flight from Chicago Midway International Airport (MDW), Chicago, Illinois. Night visual meteorological conditions prevailed at the time. A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board's Audio Laboratory for readout.

### **4. DETAILS OF INVESTIGATION**

The NTSB Vehicle Recorder Division's Audio Laboratory received the following CVR:

Recorder Manufacturer/Model: **Honeywell 6022**  
Recorder Serial Number: **09032**

#### **4.1. Recorder Description**

Per federal regulation 14 CFR 121.359, large turbine engine powered aircraft operating under 14 CFR Part 121 must be equipped with a CVR that records a minimum of the last 2 hours of aircraft operation; this is accomplished by recording over the oldest audio data. When the CVR is deactivated or removed from the airplane, it retains only the most recent 2 hours of CVR operation. This model CVR, the Honeywell 6022, is a solid-state CVR that records 2 hours of digital cockpit audio. The recorded audio data is separated by the Honeywell download software into 2 sets of audio data files: a) a 2-channel recording containing the last 2 hours of recorded events and b) a 4-channel recording containing the last 30 minutes of recorded events. During the 2-hour portion of the recording, one channel contains audio information from the cockpit area microphone (CAM) and the other channel contains a mixture of three audio sources: the captain's audio panel information, the first officer's audio panel information, and the observer pilot's audio information. The 30-minute portion of the recording contains 4 channels of audio data; one channel for each flight crew and one channel for the CAM audio information.

#### **4.2. Recorder Damage**

Upon arrival at the audio 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.

#### **4.3. CVR Channels**

The information from this report was from the 2-hour recording, which consisted of two channels of audio information. One channel contained audio information from the captain's and first officer's audio panels. The quality of this channel was excellent.<sup>1</sup> One channel contained the cockpit area microphone (CAM) audio information. The quality of this channel was good.

#### **4.4. Timing and Correlation**

The times used in this report are expressed as local time of the accident (CST).

Timing of the transcript was established by correlating the CVR events to common events on the flight data recorder (FDR) and then offsetting this value to local CST.

Radio transmissions made by the aircraft recorded on the 2-hour portion of the CVR at 3657.4, 3955.8, 3964.2, 3979.0, and 4355.4 CVR Elapsed Time (time in seconds from the start of the 2-hour recording) were correlated to the radio transmit microphone key parameter from the FDR at 95447.81641, 95746.81641,

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<sup>1</sup> See Attachment I for the CVR Quality Rating Scale

95754.81641, 95769.81641, and 96145.81641 FDR Subframe Reference Number (SRN). Each of the five radio transmissions acted as an anchor point for a linear interpolation. This linear interpolation resulted in 4324.050 CVR Elapsed Time = 96114.27344 FDR SRN. Incorporating the relationship  $CST = FDR\ SRN - 30759^2$ , the following relationship was developed:

$$CVR\ CST = CVR\ Elapsed\ Time + 16:57:11.223$$

#### **4.5. Summary of Recording Contents**

In agreement with the Investigator-In-Charge, a CVR group did not convene and only this summary report was prepared.

The recording began at 16:57 CST, as the first officer called out the aircraft was climbing through 10,000 feet. The first officer was the flying pilot, the captain the non-flying pilot, and an observer occupied the jumpseat. At 16:59 CST, the first officer noted the autopilot was engaged.

After the crew noted they were through 18,000 feet at 17:02 CST, the captain initiated a discussion about the landing runway at BBG. The first officer noted he had never landed on runway 14, only on runway 32. The crew discussed that the only runway with an ILS approach was runway 32, and runway 14 was only served by a GPS approach or the "Mark One Eyeball" approach. During this exchange, the captain yawned.

At 17:08 CST, the captain was first recorded discussing the fuel system and cross feed operations. Between 17:08 CST and 17:34 CST, on nine separate occasions, the crew discussed the irregular operation of the system due to an MEL<sup>3</sup>.

After commenting on the fuel system at 17:08 CST, the captain reported the weather at BBG was reported as "ten miles severe clear" with winds from 170 degrees at 8 knots, gusting to 16, and noting runway 14 would be used. The first officer acknowledged runway 14 would be used. The captain added they would use either the "Mark One Eyeball" or the RNAV GPS runway 14. The first officer replied he would use both. The captain then noted he put the DME for the localizer runway 32 in his side of the avionics. The first officer said the approach would be a visual approach backed up with the RNAV runway 14; the captain added that since they were doing the "Mark One Eyeball" it "doesn't matter if it works or not."

At 17:10 CST, the crew engaged in a conversation with the jumpseat rider, the captain explaining the issues related to the fuel system MEL.

At 17:13 CST, after an air traffic control (ATC) frequency change, the captain advised ATC the flight was at flight level 380. ATC asked the aircraft to confirm their altitude assignment. The captain replied the aircraft was through flight level 380 for flight level 400. The crew then discussed how the FMS had

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<sup>2</sup> See the FDR Specialist's Factual Report in the public docket of this investigation.

<sup>3</sup> MEL means Minimum Equipment List, which allows for operation of an aircraft with inoperable equipment.

leveled them off at flight level 380 and corrected the FMS to continue the climb to flight level 400. The captain concluded, "we're on track now forty forty forty three places. All distractions you know because of this [expletive] [expletive] MEL;" the first officer adding "fuel" as the captain uttered "MEL." The captain then made a passenger announcement, saying the flight expected to land at Branson at 610pm, about 40 minutes late.

At 17:22 CST, the crew noted the winds at BBG and decided upon a flaps 30 landing. The captain added, "one four is bracketed at minimum with a seven knot headwind. three two is illegal. thirty one and forty three."

At 17:27 CST, the first officer began to brief the descent and approach into BBG saying "looking at legs page," at DGD set for 250 knots and 10,000 feet, which he said was 40 miles from the field. The first officer continued, saying they would get radar vectors and let the RNAV line them up to fly visually into runway 14. He noted the touchdown zone elevation for runway 14 was 1,278 feet with an inbound course of 143 degrees. The first officer noted "min" braking "three;" the captain confirmed the braking level of 3.

The first officer continued to discuss the after landing taxi operations, stating how they would not have to do a 180 turn on the runway, adding "normally landing the other way you gotta do a one eighty on the airp- runway and taxi back. That's what we did last time. But that's not applicable this time." The captain discussed the after landing taxi further, and they agreed the first officer was in error, they would need to do the 180 turn. The captain asked if they could go all the way down to taxiways echo and foxtrot to turn around. The first officer replied, "you can but usually you stop before that and they tell you to go ahead and do the one eighty to go back." The captain joked they could use max braking and turn off at Charlie. The first officer said the last time he was at BBG, there was no gate; rather, airstairs were used for deplaning.

At 17:31 CST, the crew and the jumpseat rider engaged in social conversation, including the captain noting he had four different first officers over the last few days. Other topics included hotels and food. During the discussion, the captain acknowledged ATC descents to flight level 380, then 370, then 360.

At 17:44 CST, ATC cleared the aircraft for a pilot's discretion descent to flight level 240. After acknowledging the descent, the captain made a passenger announcement turning the seat belt sign on and reporting an expected landing at 18:00 CST.

At 17:46 CST, ATC cleared the aircraft direct to BBG. The crew then discussed the FMS and reprogrammed the direct routing and descent.

At 17:50 CST, the ATIS at BBG was received. The 2247 Zulu ATIS information Delta reported winds from 150 degrees at 12 knots gusting to 23, visibility 10 miles, few clouds at 25,000 feet, temperature 17 degrees Celsius, dewpoint -2 Celsius, altimeter 29.70, with visual approach runway 14 in use. The captain then made a pre-landing passenger announcement.

At 17:52:06 CST, the first officer noted they were passing through 18,000 feet, an altimeter setting of 29.70, and asked for the descent checklist.

At 17:52:22 CST, Springfield Approach cleared the aircraft for a pilot's discretion descent to 4,000 feet and told the aircraft to expect a visual approach

to runway 14. When the captain acknowledged, Springfield Approach offered the aircraft direct to WUTIB or VUCUG intersection. The crew agreed either was okay, and the captain so advised ATC. ATC then issued the aircraft direct to VUCUG and the captain acknowledged.

At 17:52:53 CST, the captain began the descent checks in a challenge/response manner with the first officer. Items included altimeters and bugs; cross feed; speeds of 131 and 143 knots, with +12 knots noted; autobrakes set at 3; start switches to continuous; and recall. The crew then noted they put a 5 and 10 mile ring around "it."

At 17:53:52 CST, the captain said, "you see where we're at? That's forty miles right there."

At 17:53:54 CST, the jumpseat rider responded, "yeah."

At 17:53:56 CST, the captain said, "and the airport if you look at the fix page shows you fifty five miles."

At 17:54:00 CST, the jumpseat rider responded, "okay."

At 17:54:01 CST, the captain said, "I don't know that you can see it from here...but...ah basically those lights out there have gotta be Branson Missouri...Not these but the other ones." The jumpseat rider acknowledged the captain and asked where Springfield was. The captain offered to put the stations and airports on the FMS, and then confirmed where Springfield was.

At 17:57:21 CST, the captain said, "Tell you what I think I'm flying a lot this [expletive] four day trip man. I was...too tired this mornin'. I didn't get up and go to the gym either. Two mornings in a row I didn't go."

At 17:57:40 CST, Springfield Approach cleared the aircraft to 3,000 feet and asked the aircraft to switch to frequency 126.35.

At 17:59:52 CST, as a high/low chime was recorded, the crew called passing through 10,000 feet. From this point until well after landing, no conversations were recorded with or by the jumpseat rider.

At 18:01:57 CST, the first officer said, "well I see the beacon down there...no runway yet"

At 18:02:06 CST, the captain said, "I think that's it. I see bunch of bright white lights to the right and just a little to the left of the beacon."

From 18:02:25 to 18:02:51 CST, the captain began a discussion about a recent tailstrike by an aircraft in Las Vegas. The conversation continued until Springfield Approach contacted the aircraft saying, "Southwest forty thirteen airport's ahh eleven o'clock and one five miles."

At 18:02:55 CST, the captain asked the first officer, "okay?"

At 18:02:56 CST, the first officer replied, "I'm okay with it."

At 18:02:57 CST, the captain reported to Springfield Approach, "Southwest forty thirteen field in sight."

At 18:03:00 CST, Springfield Approach cleared the aircraft for a visual approach to runway 14 at Branson, terminated radar service, and told the aircraft to contact Branson Tower on frequency 128.15. The captain replied, "Southwest forty thirteen one two eight one five for the tower good night."

At 18:03:15 CST, the captain reported to Branson Tower that the aircraft was descending through 6,600 feet for 3,000 feet, the aircraft was direct to

VUCUG, and they were on a visual approach for runway 14. Branson Tower responded by clearing the aircraft to land on runway 14. The captain acknowledged the landing clearance. The captain then said to the first officer, "you're out of [unintelligible], but I don't think you're gonna need it. Just thinkin'."

At 18:03:48 CST, a helicopter called Branson Tower to transition through the area at 2,000 feet from northwest to southeast. Branson Tower advised the helicopter that a Boeing 737 was north of the airport and was going to be on a 4 to 5 mile final for runway 14. Branson Tower then informed Southwest 4013 the helicopter was 8 miles northwest and would be transitioning southeast at 2,000 feet. The captain told Branson Tower he was looking for the traffic. During this exchange, the first officer asked for flaps 1, and the captain acknowledged the flap request.

At 18:04:41 CST, the helicopter told Branson Tower the Southwest flight was in sight. Branson Tower told Southwest 4013 the helicopter had him in sight, and the captain responded, "Southwest forty thirteen roger."

At 18:05:41 CST, the first officer asked for flaps 5, and the captain acknowledged.

At 18:06:35 CST, the first officer asked for gear down, and the captain acknowledged, followed by the sound of increased noise similar to the gear in transit.

At 18:06:44 CST, the sound of a cyclic warning, similar to the autopilot disconnect, was recorded.

At 18:06:58 CST, the first officer asked for flaps 15, and the captain acknowledged. The first officer then asked for his speed to be set, and the captain acknowledged.

At 18:07:21 CST, the first officer asked for flaps 30, and the captain acknowledged, prompting for the before landing checklist. The first officer acknowledged, and the captain began the before landing checklist in a challenge/response manner. Checklist items included speed brake armed with a green light, landing gear down with three green, flaps 30 green light, and before landing checklist complete. The captain then noted through 1,000 feet, speed of 148 knots, and cleared to land. The first officer responded "we're level flight for now."

At 18:08:09 CST, the first officer said, "sinking five hundred."

At 18:08:26 CST, the captain said, "five hundred."

At 18:08:36 CST, the captain told the first officer he was a little high; the first officer responded, he was correcting.

At 18:08:44 CST, the first officer noted he was correcting on speed.

At 18:08:51 CST, the captain said, "right to left crosswind, you're ah there's the glideslope, a little fast too."

At 18:09:04 CST, the captain said, "airspeed;" the first officer responded, "correcting."

At 18:09:10 CST, and automated voice called out "one hundred. fifty. ten."

At 18:09:12.9 CST, the captain said, "fifty."

At 18:09:13.9 CST, the captain said, "five four three two one."

At 18:09:15.1 CST, the sound of thunk was recorded, similar to main gear touchdown.

At 18:09:15.7 CST, the captain said, "extended."

At 18:09:16.8 CST, the sound of thunk and increased background noise was recorded, similar to nose wheel touchdown.

At 18:09:19.6 CST, the background noise increased, similar to thrust reverser operation.

At 18:09:21.9 CST, the captain said, "deployed."

At 18:09:22.7 CST, the captain said, "autobrake disarm."

At 18:09:25.7 CST, the captain said, "I hope this is [expletive] it."

At 18:09:30.1 CST, the background sound decreased, similar to the aircraft slowing down and cessation of thrust reverser operation.

At 18:09:31.5 CST, the first officer said, "boy."

At 18:09:34.0 CST, the captain said, "this ain't it."

At 18:09:37.3 CST, the first officer said, "did we [expletive] land at the wrong airport?"

At 18:09:39.2 CST, the captain said, "I think you just did...I did too."

At 18:09:44.2 CST, the first officer replied, "Holy crap."

At 18:09:46 CST, the captain called Branson Tower and confirmed they were not at Branson.

At 18:10:35 CST, the captain made a brief passenger announcement telling passengers to remain seated. He then called the flight attendant on the interphone and informed them they had landed at the wrong airport.

At 18:11:24 CST, the first officer said he thought they were at the Clark Airport.

At 18:11:40 CST, Branson Tower asked if the aircraft would be departing for Branson soon. The captain replied no.

For the remainder of the recording, the crew engaged in the following activities:

- Advised Clark common traffic advisory frequency (CTAF) they were on the runway (multiple times);
- Contacted Southwest dispatch by telephone to inform them of the wrong airport landing and coordinate transportation for the passengers;
- Contacted the Southwest Pilot's Union to inform them of the wrong airport landing;
- Shut down the engines and operated on APU;
- Spoke with Branson Tower to coordinate communications with Clark airport personnel;
- Informed the passengers of the wrong airport landing;
- Spoke with flight attendants to coordinate activities;
- At 18:42 CDT, the captain mentioned, "I thought you'd be here before. I just thinkin'..." and

- At 19:02:39 CDT, the crew pulled the CVR and FDR circuit breakers at the end of the recording.



## 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.