

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, DC 20594

December 15, 2010

Cockpit Voice Recorder

Specialist's Factual Report

By Bill Tuccio

1. EVENT

Location: Houston, Texas
Date: May 12, 2009, 19:45 Central Daylight Time (CDT)
Aircraft: Boeing-737-3H4, N371SW
Operator: Southwest Airlines, Flight 519
NTSB Number: CEN09IA294

2. GROUP

A group was not convened.

3. SUMMARY

On May 12, 2009, at 19:45 central daylight time (CDT), a Boeing-737-3H4, registration N371SW operated by Southwest Airlines as flight 519, landed at the William P. Hobby Airport (KHOU), Houston, Texas. During the landing on runway 22 (7,602 feet by 150 feet), the airplane sustained minor damage and experienced a fire in the area of the right landing gear when three of the four main landing gear tires blew-out during touchdown. The 2 flight crew, 3 flight attendants, and 48 passengers evacuated on the runway. The domestic passenger flight was being operated under the provisions of Title 14 Code of Federal Regulations Part 121. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed. The flight originated from the Louis Armstrong New Orleans International Airport (KMSY), New Orleans, Louisiana, at 18:30 CDT. A solid-state 2 hour cockpit voice recorder (CVR) was sent to the National Transportation Safety Board's Audio Laboratory for readout.

4. DETAILS OF INVESTIGATION

On May 18, 2009, the NTSB Vehicle Recorder Division's Audio Laboratory received the following CVR:

Recorder Manufacturer/Model: **Honeywell 6022 SSCVR 120**
Recorder Serial Number: **62799**

4.1. Recorder Description

Per federal regulation, aircraft manufactured prior to April 7, 2010, 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. When the CVR is deactivated or removed from the airplane, it retains only the most recent 30 minutes or 2 hours of CVR operation, depending on the CVR model. This model CVR, the Honeywell 6022 SSCVR 120, 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 two audio sources: the captain's audio panel information and the first officer's audio panel 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 recording consisted of four channels of audio information. Two of the channels contained audio information from the captain's and first officer's audio panels. The quality of these two channels was excellent.¹ One channel contained the cockpit area microphone (CAM) audio information. The quality of this channel was good. The fourth channel contained audio information from the aircraft's Public Address (PA) system. 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 expressed in central daylight time (CDT).

Timing of the transcript was established by correlating the CVR events to common events on the FDR. Specifically, the sound of the touchdown recorded on the CVR at 00:27:32 CVR elapsed time was correlated to FDR events indicating touchdown at approximately 19:45:31 CDT.

4.5. Summary of Recording Contents

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

¹ See Attachment I for the CVR Quality Rating Scale

All intra-cockpit communications for the flight were taken from the CAM as the CVR recorded no hot microphones. Audio was heard on the individual captain and first officer radio channels. At 18:34:07, during passenger boarding, the crew can be heard discussing minimum equipment list (MEL)² items and the impact of the items on the flight. The flight departed New Orleans and flew enroute to Houston with the captain flying the leg. Enroute the crew discussed a dispatch operational requirement to land on runway 22 at Houston and how the wind, airport operations and runway lengths favored runway 12.

At 19:19:12 the captain called for the descent checklist. During the execution of the checklist in response to the auto brake item the captain responded "two...I'm sorry off and off."

At 19:38:13 the aircraft was cleared for the ILS 12R circle to land runway 22 with wind from 170 degrees at 7 knots, followed by execution of before landing checklists. At 19:45:31 there is a sound similar to touchdown followed five seconds later by the sound of a loud thump followed by a loud, cyclical rattling sound, decreasing in frequency over the next few seconds. At 19:45:41 the first officer called out a blown tire and the captain acknowledged. The first officer advised the tower of a blown tire on the right hand side. The tower acknowledged and advised emergency response equipment was on the way.

At 19:46:15 the captain made a cabin announcement advising the passengers to remain seated due to the blown tire. He then asked the flight attendant if she saw any smoke, to which she replied she did not. As the captain was speaking to the flight attendant, another taxing flight (Southwest 45) advised the tower, "that fire is still burning." The tower relayed this information to the aircraft. The first officer confirmed with the tower two times the existence of a fire, one time being blocked by other radio traffic related to normal airport operations.

At 19:47:02 the first officer advised the captain of a small fire and, after confirming the fire with the tower an additional time, at 19:47:44 asked the captain if he wanted to evacuate. The captain acknowledged affirmatively. Immediately thereafter, the first officer advised the tower they were going to evacuate out the left hand side of the aircraft. At 19:47:56 the captain called for the evacuation checklist. At 19:48:02 there is a sound of a single chime followed by the captain telling the flight attendant "hello there yeh we have a fire on the right hand side of the airplane we are going to evacuate on left side of aircraft the left side of the aircraft." The flight attendant responded "sorry I missed that" and the captain repeated, "we are going to evacuate left side of the aircraft left side of the aircraft," to which the flight attendant responded, "all right thank you."

The captain and first officer continued the evacuation checklist, including the flaps positioned to 40 and numerous sounds similar to switches being set. Also at this time, 19:48:20, the cabin channel recorded the flight attendant announcing "evacuate on the left evacuate on the left come out leave everything leave everything leave everything out out out."

² Federal Air Regulations permit the operation of an aircraft with certain equipment inoperative. Permissible inoperative equipment is listed in the Minimum Equipment List (MEL) for an aircraft and often contains limitations and procedures related to the inoperative equipment.

The recording ends at 19:48:26 with electrical power being removed from the CVR.

Bill Tuccio
Vehicle Recorder Division

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.