NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, DC 20594

SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

DCA18IA092

By
Christopher Babcock

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 a Safety Board group investigative effort. The summary or parts thereof, if taken out of context, could be misleading. The summary should be viewed as an investigative 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.

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November 13, 2018

Cockpit Voice Recorder

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1. EVENT SUMMARY

Location:	Honolulu, Hawaii
Date:	February 13, 2018
Aircraft:	Boeing 777, Registration N773UA
Operator:	United Airlines, Flight 1175
NTSB Number:	DCA18IA092

On February 13, 2018, about 1200 Hawaiian Standard Time (2200 UTC), United Airlines flight 1175, a Boeing 777 registration N773UA, experienced an in-flight separation of a fan blade and subsequent loss of the inlet and fan cowls of the right engine, a Pratt & Whitney PW4077, during descent into Daniel K. Inoyue International Airport (KHNL), Honolulu, Hawaii. The crew declared an emergency and proceeded to KHNL without further incident. There were no injuries to the 363 passengers and 10 crew members and the airplane received minor damage. The airplane was operating under Title 14 *Code of Federal Regulations (CFR)* Part 121 as a regularly scheduled passenger flight and had originated from San Francisco International Airport (KSFO), San Francisco, California. A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for evaluation.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following CVR:

Recorder Manufacturer/Model:	**Honeywell HFR5-V**
Recorder Serial Number:	**CVR-01326**

3.1 CVR Carriage Requirements

Per federal regulation, turbine engine powered aircraft operating under 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 at least the most recent 2 hours of CVR operation.

3.2 Recorder Description

This model CVR, the Honeywell HFR5-V, records a minimum of 120 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]

Table 1. Audio Quality.

Channel Number	Content/Source	Quality	Duration (hh:mm:ss)
1	Captain	Excellent	2:10:48
2	First Officer	Excellent	2:10:48
3	Jumpseat	Excellent	2:10:48
4	CAM	Good	3:13:00

3.5 Timing and Correlation

Timing on the transcript was established by correlating the CVR events to common events on the flight data recorder (FDR). Specifically, the last five radio transmissions that the aircraft made prior to landing were correlated to the radio transmit microphone key parameter from the FDR. Each of the five radio transmissions acted as an anchor point for a linear interpolation between the remaining CVR events. Once a correlation between the two recorders was established, a reference to UTC time was determined using the recorded UTC time parameters on the FDR.

3.6 Description of Audio Events

In agreement with the Investigator-In-Charge, a CVR group did not convene. A summary of events from the CVR is in Table 2.

[1] See attached CVR Quality Rating Scale.

Table 2. Selected events from the CVR.

Time (UTC)	Event
2158:27	Sound of bang.
2158:58	The flight crew told flight attendants to take their seats.
2200:27	United 1175 declared mayday.
2205:28	The captain noted a lot of vibration on the controls.
2205:48	The captain asked the jumpseat occupant to go into the cabin and visually inspect the engine.
2207:47	The jumpseat occupant returned and reported the entire outer case of the engine was gone. The captain wondered if debris had struck the stabilizer due to the vibration on the controls.
2208:10	The captain asked the jumpseat occupant to go back again and take a couple pictures of the damage.
2210:37	The first officer reported the situation to dispatch.
2217:41	The crew discussed crossfeeding fuel and decide to wait until passing 10000 feet.
2221:05	The crew discussed a flaps 20 approach at about 145 knots
2227:50	The captain briefed flight attendants on the situation.
2229:51	The crew initiated fuel crossfeed.
2230:36	The crew briefed arrival procedures into Honolulu.
2234:00	The crew reported Honolulu Airport in sight.
2234:20	The crew lowered landing gear.
2236:12	The crew finished the landing checklist.
2237:15	The aircraft touched down.

Time (UTC)	Event
2237:34	The crew told passengers to remain seated.
2238:55	The crew asked ARFF to visually inspect the engine for leaks and risks of fire.
2241:57	ARFF reported a minor hydraulic leak. The crew stated their intention to taxi to the gate.
2202:34	The aircraft reached the gate and the crew performed the engine shutdown checklist.

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.