

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



**SPECIALIST'S REPORT OF INVESTIGATION
SOUND SPECTRUM STUDY
ERA15FA129**

**By
James Cash**

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

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Sound Spectrum Study

Specialist's Factual Report
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1. EVENT SUMMARY

Location: Miami, Florida
Date: February 11, 2015 1439 Eastern Standard Time (EST)
Aircraft: Beechcraft 1900C, VY1674
Operator: Aeropanamericano, C.A
NTSB Number: ERA15FA129

On February 11, 2015, at 1439 Eastern Standard Time, a Beech 1900C, Venezuelan registration VY1674, registered to and operated by Aeropanamericano, C.A., was destroyed during collision with terrain, following a loss of engine thrust during initial climb from Kendall-Tamiami Executive Airport (KTMB), Miami, Florida. The two foreign certificated pilots and two passengers were fatally injured. The repositioning flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the planned flight to Providenciales International Airport (MBPV), Providenciales, Turks and Caicos

A tape cockpit voice recorder (CVR) was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for evaluation. The recovered recording was examined to determine engine/propeller performance during the accident takeoff.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The good quality 4-track, 30-minute CVR recording was examined to determine if engine/propeller performance could be extracted from the background sounds heard on the recording. A CVR group was convened that prepared a transcript of select portions of the recording. See Group Chairman's Factual Report of Investigation, CVR Transcript.

3.1 CVR Recording

The takeoff segment of the accident recording was examined to document the background sounds.

The recording was analyzed using signal processing software that separates and displays the various frequency components of the audio recording. The software also permits the plotting of the frequency components using differential color scales. The resulting spectrogram plots depict elapsed time in seconds along the X or horizontal axis and frequency in Hertz is depicted along the Y or vertical axis. Intensity of the various frequency signals is shown by colors that vary from blue to red indicating low to higher intensities.

Chart 1 depicts the engine and propeller sound signatures observed on the cockpit area microphone channel of the accident CVR recording. As seen on the plot, the loudest sounds are produced by the two propellers. Additionally, during the initial portion of the takeoff roll, the two engine sound signatures can also be identified.

Several harmonic traces of the various sounds can be observed on the spectrogram plot. When the two engine/propellers were increasing in speed for takeoff, one of the engines/propeller accelerated faster than the other. For additional information about the engine/propeller performance, see the Flight Recorder Factual Report of Investigation.

It is not impossible to determine which engine/propeller (left or right) is making the traces that are seen on the spectrogram charts.

Chart- 1
Spectrogram of Engine/Propeller Sound Signatures on Takeoff



Chart -2 depicts the same data shown on the previous chart but zoomed in to show additional frequency detail of the engine sound signatures seen on the takeoff portion of the recording.

Chart 2
Accident Takeoff Spectrogram (zoomed)



It can be seen on Chart-2 that the beginning of the takeoff appeared normal. During the takeoff roll, two engine sound signatures are identifiable. There is no way to associate which sound trace was being produced by which engine. Utilizing engine rotational data provided by the manufacturer, both engines peak at about 95 to 96% N-2. At about 1437:54 EST, one of the aircraft's propellers begin to start to slow down (decrease in frequency). This propeller speed decrease is followed 4 seconds later by a decreasing N-2 in one of the aircraft's engines. The sound signatures that are associated with the aircraft's engines are only visible on the spectrum plots during the initial portion of the takeoff roll. As the aircraft increases in speed, the background noise totally obscures the faint engine sounds.

The data shown on Chart-3 is select parameters recovered from the aircraft's flight data recorder ¹ along with information obtained from the sound spectrum study. The additional sound spectrum study data is highlighted with red arrows on the chart.

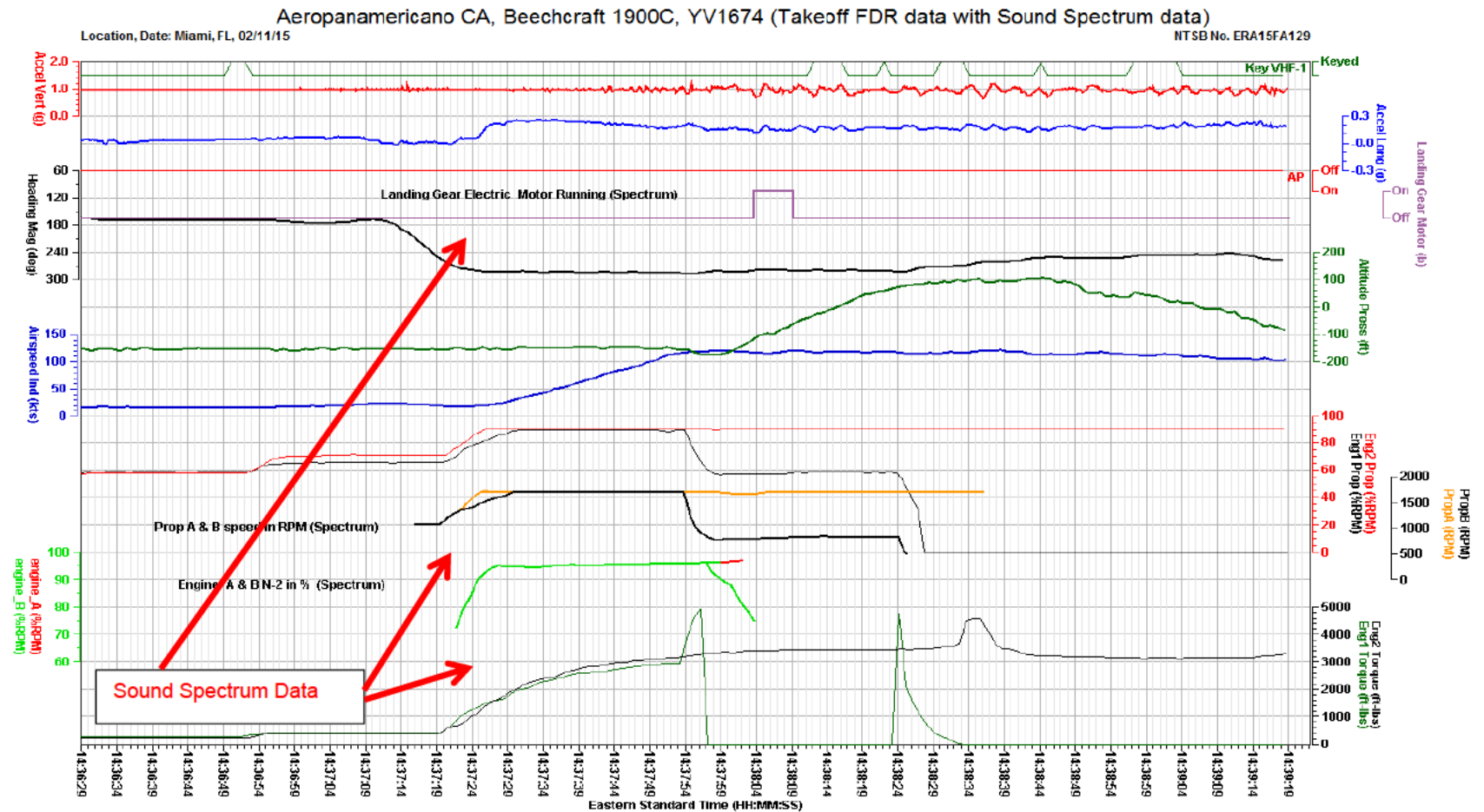
Additionally a sound trace that is associated with the aircraft's landing gear retraction/extension electric motor running was audible on channel 3 of the cockpit voice recorder. This data is also included on Chart 3.

James Cash
Electronics Engineer

¹ For additional information concerning the data recovered from the flight data recorder, see the Flight Recorder Factual Report of Investigation.

CHART-3

Accident FDR and Sound Spectrum Data



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Takeoff FDR data with Sound Spectrum data

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