National Transportation Safety Board
Office of Research and Engineering
Washington, D.C. 20594

Airplane Performance Study

Revised 11/2/09

Specialist's Report of Investigation
Timothy Burtch

A. ACCIDENT

Location:	Columbia, South Carolina
Date:	September 19, 2008
Time:	11:53 pm EDT
Airplane:	Learjet Model 60, N999LJ
NTSB Number:	DCA08MA098

B. GROUP

Chairman: Timothy Burtch
National Transportation Safety Board
Washington, DC

C. SUMMARY

On September 19, 2008, at about 11:53 p.m. Eastern Daylight Time (EDT), a Learjet Model 60 (N999LJ) operated by Global Exec Aviation as an on-demand passenger flight under 14 CFR Part 135 overran Runway 11 while departing Columbia, South Carolina, enroute to Van Nuys, California. The 2 crewmembers and 2 of the 4 passengers were fatally injured, the other 2 passengers suffered serious injuries. The aircraft was destroyed by extensive post-crash fire. Weather was reported as clear with light winds.

Tire debris and portions of airplane components were found along the 8,601 foot runway. According to witnesses, the beginning of the takeoff roll appeared normal but then sparks were observed as the airplane travelled along the runway. The airplane continued beyond the runway threshold, through the approximately 1,000 foot runway safety area, and impacted airport lighting, navigation facilities, an airport perimeter fence, and concrete marker posts. The airplane then crossed a roadway and came to rest on an embankment on the far side of the road.

D. PERFORMANCE STUDY

N999LJ did not have a flight data recorder installed. In addition, no radar data was available for the accident flight. As a result, the performance calculations are based on the Sound Spectrum Study of the Cockpit Voice Recorder (CVR) performed by the sound spectrum group. Details on the CVR as well as the work performed by the group are documented in the sound spectrum study[1].

Approximately 50 seconds of audio at the end of the two hour CVR recording contained spectra from the engine and tires. The last 30 seconds of the recording captured N999LJ's take-off roll down Columbia's Runway 11, and, when combined with known specifications for the recorder and runway surface, an estimate of the airplane's ground speed could be made. The estimated ground speed is shown in Figure 1 to the point that the sound spectrum group could accurately extract data.

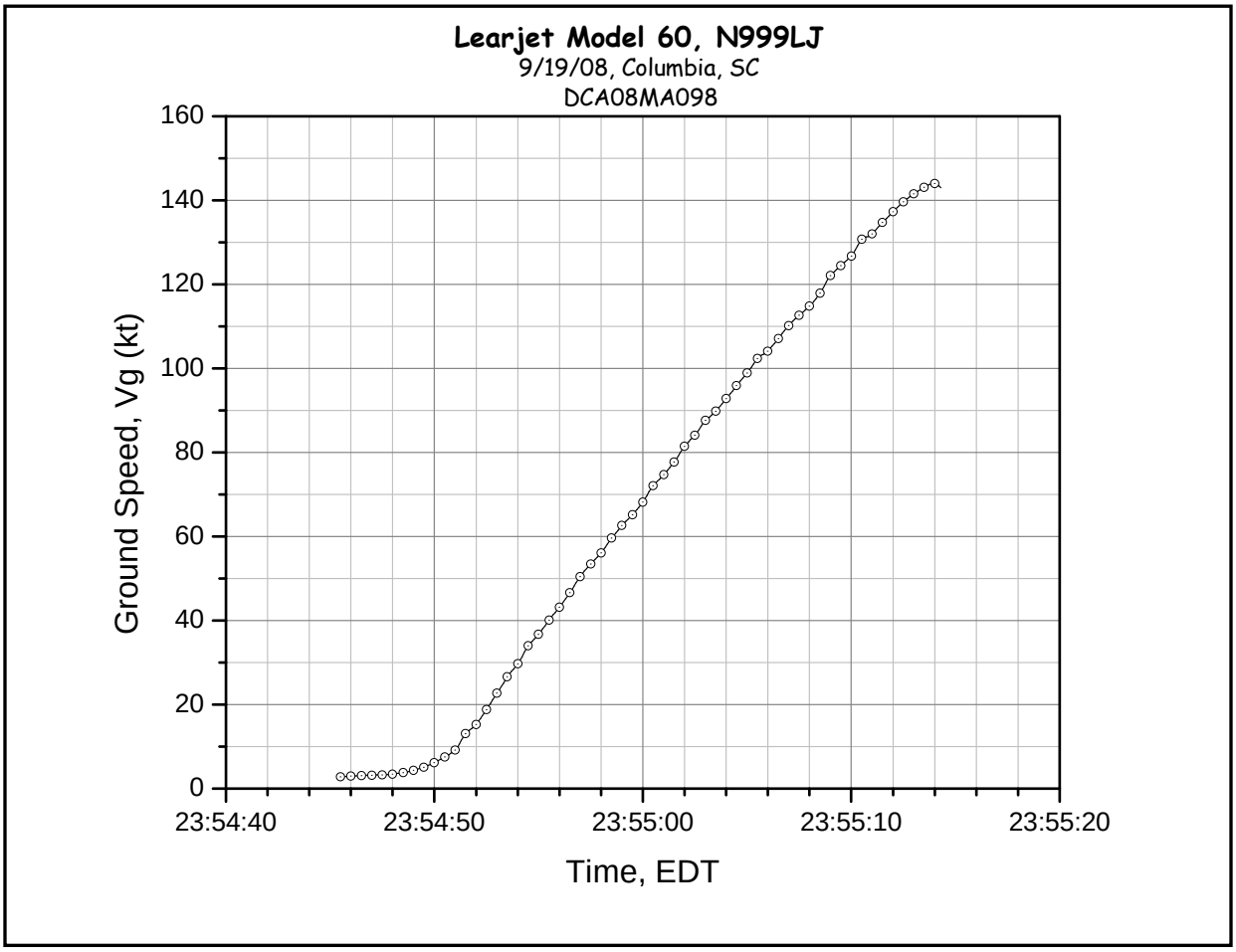

Figure 1: Ground Speed of N999LJ Based on Sound Spectrum Data

[1] National Transportation Safety Board, Vehicle Recorder Division, *Group Chairman's Sound Spectrum Study Cockpit Voice and Addenda*, Learjet Model 60, N999LJ, *Columbia, South Carolina, September 19, 2008,* NTSB Accident Number DCA08MA098. (Contact NTSB at pubinq@ntsb.gov).

Integrating the sound spectrum ground speed resulted in an estimate of N999LJ's position on the runway during the accident flight. A trapezoidal integration scheme was used and the result is shown in Figure 2.

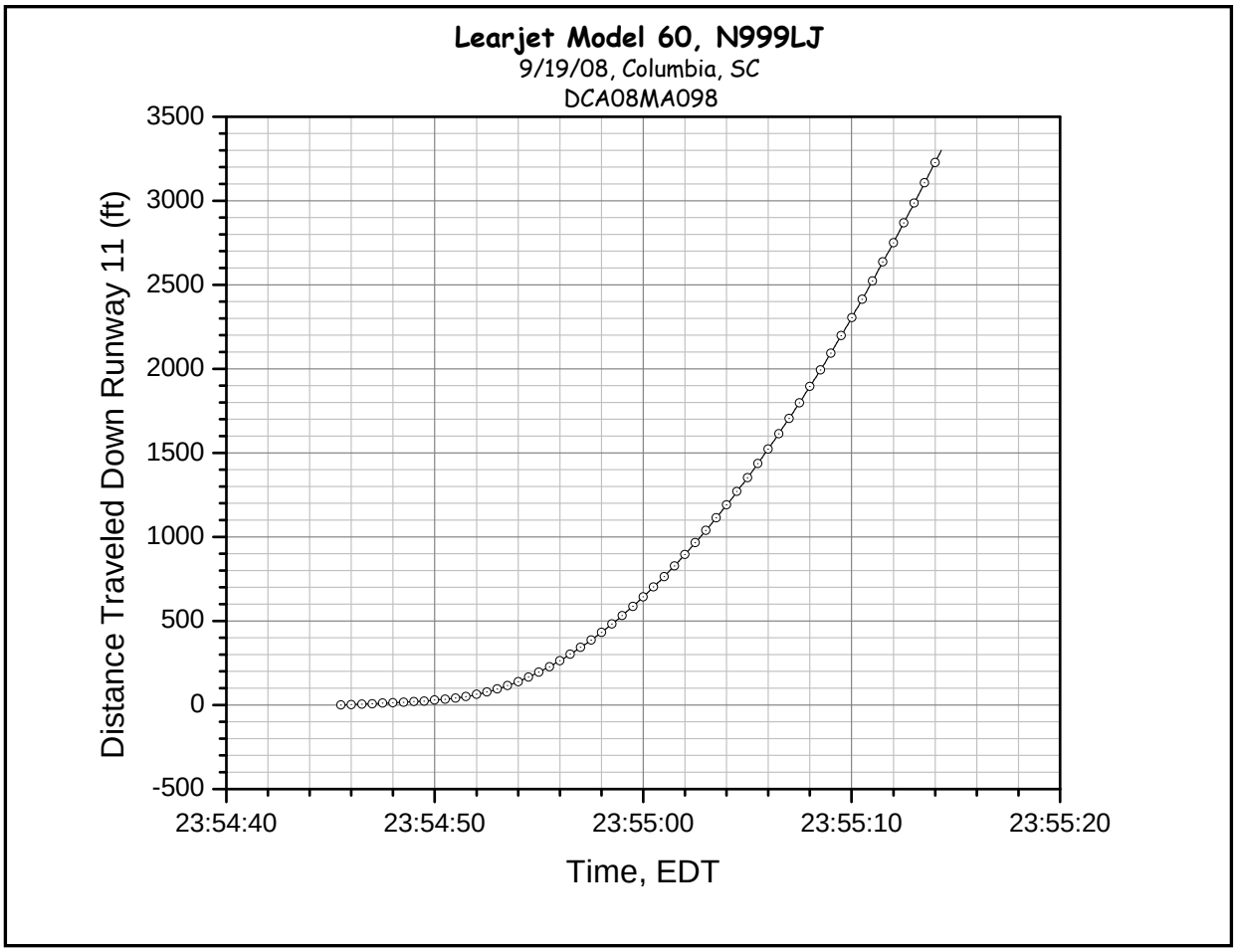

Figure 2: Displacement of N999LJ Based on Sound Spectrum Data

N999LJ's position when the CVR begins recording usable sound spectra is not exactly known. However, radio communications and the wreckage subsequently recovered down the runway made an estimate of the airplane's initial position possible.

Attachment 1[2] contains an overlay of the Columbia, SC, Metropolitan Airport including some of the results from the airplane performance study. The sound spectrum integration is shown in pink. In addition, recorded CVR comments are shown in yellow, and wreckage found during the recovery portion of the investigation are shown as marked.

[2] National Transportation Safety Board, Office of Research and Engineering, *Group Chairman's Airplane Performance Study, Attachment 1*, Learjet Model 60, N999LJ, *Columbia, South Carolina, September 19, 2008*, NTSB Accident Number DCA08MA098. (Contact NTSB at pubinq@ntsb.gov).

It should be noted that the sound spectrum group ended the ground speed analysis at 1155:14.3 EDT as shown in Figure 1. The performance group extrapolated the ground speed to 1155:30.5 EDT for the purpose of positioning the CVR text in approximately the proper location. However, the extrapolation, denoted in the attachment as red instead of yellow text, was done by visual inspection and represents only one fairing of the data.