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

Radar Performance Study Addendum 1

Specialist Report
Timothy Burtch

ACCIDENT

Location: Teterboro, New Jersey
Date: May 15, 2017
Time: 1930 GMT (1530 EDT)
Airplane: Learjet LJ35, N452DA
NTSB Number: CEN17MA183

GROUP

No vehicle performance group was formed.

SUMMARY

On May 15, 2017, about 1529 eastern daylight time, a Learjet 35A, N452DA, departed controlled flight while on a circling approach to runway 1 at Teterboro Airport (TEB), Teterboro, New Jersey, and impacted a commercial building and parking lot. The pilot-in-command (PIC) and the second-in-command died; no one on the ground was injured. The airplane was destroyed by impact forces and postcrash fire. The airplane was registered to A&C Big Sky Aviation, LLC, and was operated by Trans-Pacific Air Charter, LLC, under the provisions of Title 14 Code of Federal Regulations Part 91 as a positioning flight. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed. The flight departed from the Philadelphia International Airport, Philadelphia, Pennsylvania, about 1504 and was destined for TEB. The flight crew was attempting a visual approach to runway 1 from the instrument landing system (ILS) approach to runway 6. At 1523:23.7, New York Approach Control cleared N452DA for the "ILS runway six, circle runway one".

RADAR PERFORMANCE STUDY ADDENDUM

The Federal Aviation Administration (FAA) emphasizes a stabilized approach to avoid a loss of control during landing. FAA Advisory Circular (AC) 91-79A, Mitigating the Risks of a Runway Overrun Upon Landing[1], lists criteria for a stabilized approach as follows:

[1] See:
https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1025626
and https://www.faa.gov/news/updates/?newsId=86867.

> The airplane should be stabilized on profile before descending through the 1,000-ft window or through the 500 ft above touchdown zone elevation (TDZE) window in visual meteorological conditions (VMC). Configuration, trim, speed, and glidepath should be at or near the optimum parameters early in the approach to avoid distractions and conflicts as the airplane nears the threshold window. The electronic or visual glidepath or an optimum glidepath angle of 3 degrees should be established and maintained. For the purposes of this AC, approaches that require a glidepath angle greater than 3 degrees are a "special case." The airplane must be in the proper landing configuration, on the correct lateral track, the correct vertical track and at the proper airspeed. It should be noted, as it applies to stabilized approaches, that following lateral and vertical tracks should require only normal bracketing corrections.

Runway 1 at TEB has a 3.46° glideslope and a displaced threshold of 771 ft.

Radar data for the approaches to runway 1 at TEB for the accident airplane and eight previous flights[2] on the day of the accident were compared to the FAA stabilized approach criteria listed above. Visual meteorological conditions prevailed, so the comparison is made at 500 ft above TDZE (vs. 1,000 ft for instrument meteorological conditions); "normal bracketing" bank angles as defined by the FAA are between ± 5 degrees. The parameters evaluated are shown in Figures 1 and 2. These evaluations indicate that:

- Six of the eight previous flights, in addition to the accident flight, were above the glideslope at 500 ft above TDZE (by between about 100 and 250 ft).
- Seven of the eight previous flights, in addition to the accident flight, were banking between 10-30 degrees between the 500 ft above TDZE point and the runway.

The radar data therefore show that most of the previous flights examined were unstable based on the above-cited FAA stable approach criteria, despite radar ground tracks that showed all but one[3] turned at or slightly beyond TORBY[4], as the accident flight was instructed to do.

[2] The FAA provided data for nine previous flights that landed at TEB between 1900Z and 1930Z (1500 and 1530 EDT). However, one flight did a go-around and was not included in the comparison.
[3] The Challenger 604 went about one nautical mile beyond TORBY before turning.
[4] TORBY is the final approach fix/locator outer marker for the ILS approach to runway 6.

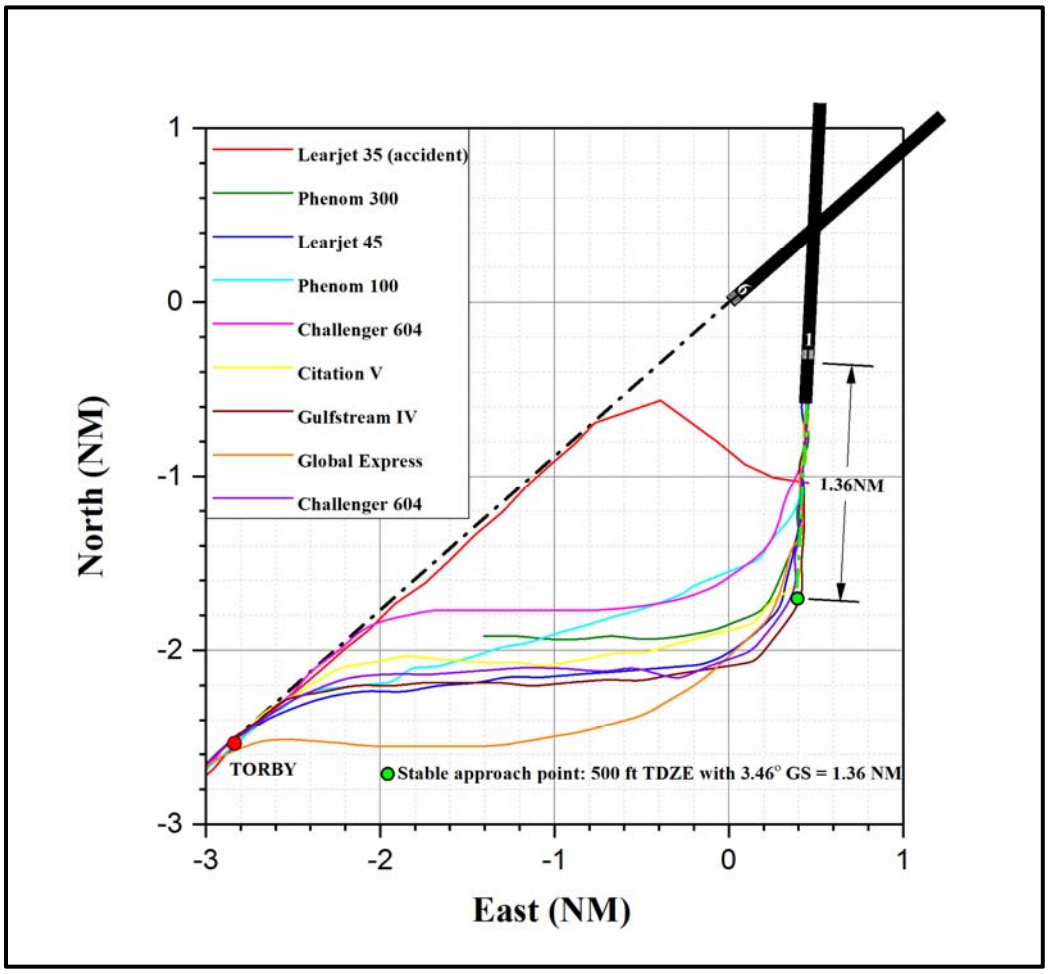

Figure 1: Previous Flights from Day of the Accident

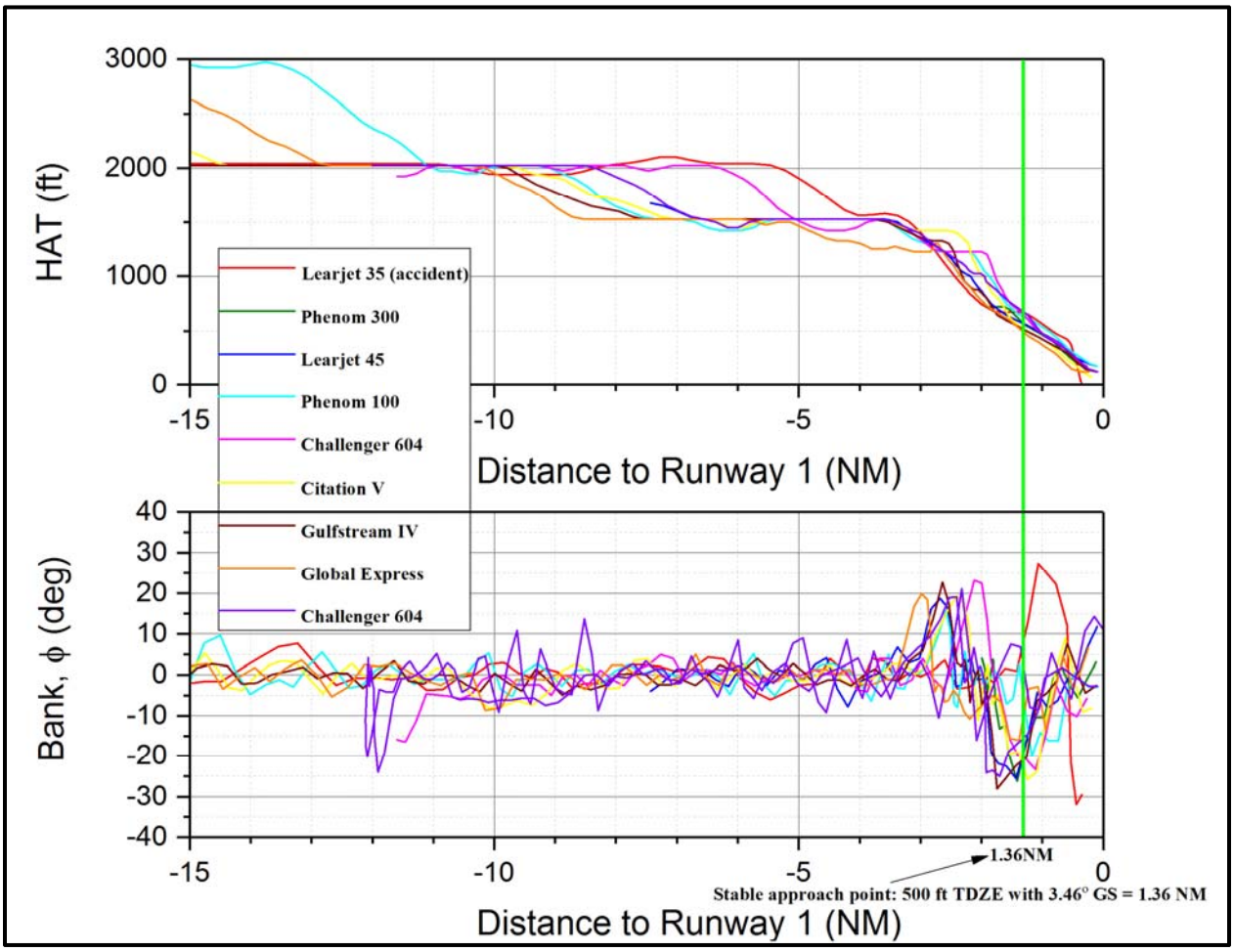

Figure 2: Previous Flights from Day of the Accident

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