

# National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA23FA174

## **AIRPLANE PERFORMANCE STUDY**

July 28, 2023  
Timothy Burtch

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## **A. ACCIDENT**

Location: Gulf of Mexico, near Clearwater, Florida  
Date: March 30, 2023  
Time: 1847 EDT  
2247 GMT  
Airplane: Cessna Citation 525B, N869AC

## **B. AIRPLANE PERFORMANCE STUDY**

No airplane performance group was formed.

## **C. SUMMARY**

On March 30, 2023, about 1815 eastern daylight time (EDT), a Cessna Citation 525B, N869AC, was substantially damaged when it was involved in an accident over the Gulf of Mexico. The airline transport pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 corporate flight.

The flight originated at 1647 EDT from Walnut Ridge Regional Airport (ARG), Walnut Ridge, Arkansas, and was destined for Page Field Airport (FMY), Fort Myers, Florida. The pilot reported that while in a cruise descent at an altitude of about 30,000 ft, and about 1815, he felt two “big jolts.” He felt the airplane yaw, looked at the engine instruments, and noted no anomalies. After that, he looked out the left side window and noted that the left winglet had separated from the wing. He looked out the right-side window and saw the right winglet. He elected to disconnect the autopilot, reduce engine power, and declare an emergency. The pilot performed an emergency landing at Tampa International Airport (TPA), Tampa, Florida, without issue.

The airplane was equipped with Tamarack Active Technology Load Alleviation System (ATLAS) Winglets<sup>1</sup>.

Times in the study are quoted in EDT. Greenwich Mean Time (GMT) = EDT + 4 hr.

## **D. THE AIRPLANE**

A picture of the accident airplane, a Cessna Citation 525B, is shown in Figure 1. The airplane was manufactured by Cessna in 2005 and is registered to Minnesota Equipment Leasing Services, Inc.

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<sup>1</sup> According to the FAA Airworthiness records, the Tamarack winglets were installed on 12/7/22.

## **E. WEATHER SUMMARY**

A routine weather observation for St Pete-Clearwater International Airport about an hour before the accident was reported as:

***METAR KPIE 302153Z 01003KT 10SM CLR 28/14 A3012***

The automated surface weather observation at St Pete-Clearwater International Airport on March 30 at 1753 EDT is wind from 010° at 3 knots (kt); 10 statute miles visibility; clear skies; temperature 28° Celsius (C); dew point 14°C; altimeter 30.12" of mercury.

## **F. AIRPLANE PERFORMANCE STUDY**

The airplane performance study is based on data recovered from a Garmin GTN 725 and Automatic Dependent Surveillance-Broadcast (ADS-B) data provided by the Federal Aviation Administration (FAA). See the "Global Positioning System Download Factual Report" for more information about the GTN 725.

ADS-B is a primary technology supporting the FAA's Next Generation Air Traffic Control System, or NextGen, which is shifting airplane separation and air traffic control from ground-based radar to satellite-derived positions. ADS-B broadcasts an airplane's Global Positioning System (GPS) position to the ground where it is displayed to Air Traffic Control (ATC). The GPS position is also transmitted to other airplanes with ADS-B receivers, either directly or relayed through ground stations, to allow self-separation and to increase situational awareness.

GPS has an accuracy of approximately 20 meters in both the horizontal and vertical dimensions. GPS augmented with the Wide Area Augmentation System (WAAS) is accurate to approximately 1.5 - 2 meters.

Figure 2 highlights the flight legs that were used in the study to compare altitude, speed, and rate of climb. Figures 3 and 4 show the comparisons.

The flight leg from ARG to TPA where the left winglet departed the airplane recorded the highest decent rate of any of the flight legs that were examined. Both GTN and ADS-B data indicate a descent rate of about 5,300 ft/min<sup>2</sup> as the airplane

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<sup>2</sup> The descent rate where the winglet departed the airplane is the highest recorded for all flights since the Tamarack winglets were installed on N869AC based on FAA ADS-B data. Data from the GTN were not available for all flights; as a result, a comparison of dynamic pressure and Mach number could not be made.

descended through 30,000 ft (where the pilot reported losing the winglet). The GTN data from the preceding flight leg (ANE to ARG) recorded a maximum descent rate of about 3,100 ft/min. In addition, GTN data from a flight earlier in the month (ARG to ANE) indicate a maximum descent rate of about 5,000 ft/min.

Finally, Figure 5 shows the accelerations estimated from GTN data for the accident flight.

## **G. SUMMARY AND CONCLUSIONS**

The pilot of N869AC reported losing the left winglet while in a cruise descent at an altitude of about 30,000 ft. At this point in the Garmin and FAA data, the airplane was descending at about 5,300 fpm, the highest descent rate in the 41 flights since installing the winglets according to FAA ADS-B data. Just prior to losing the winglet, the airplane experienced a +0.2 g increase in longitudinal acceleration as well as a -0.2 g decrease in vertical acceleration: this is likely associated with the pilot's airplane-nose-down elevator input to initiate the cruise descent. About a half-minute later, the winglet departed, and the airplane experienced a +0.5 g increase in vertical acceleration as the airplane pitched up.

Figure 6 shows the altitude, airspeed, and Mach number where the winglet departed N869AC along with the 525B flight envelope provided by Tamarack<sup>3</sup>.

Submitted by:

Timothy Burtch  
Specialist - Airplane Performance  
National Transportation Safety Board

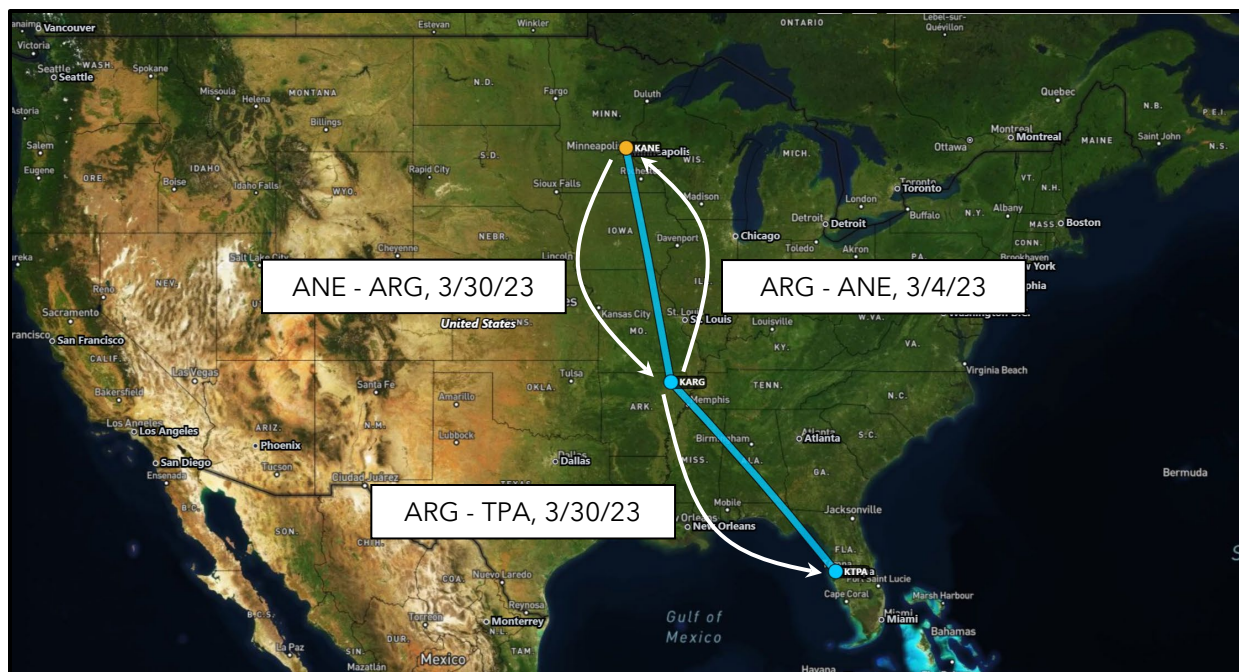
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<sup>3</sup> The pilot did not recall using speedbrakes during the cruise descent but was not entirely sure. The extension of speedbrakes would result in additional vibration and dynamic loads on the wing.

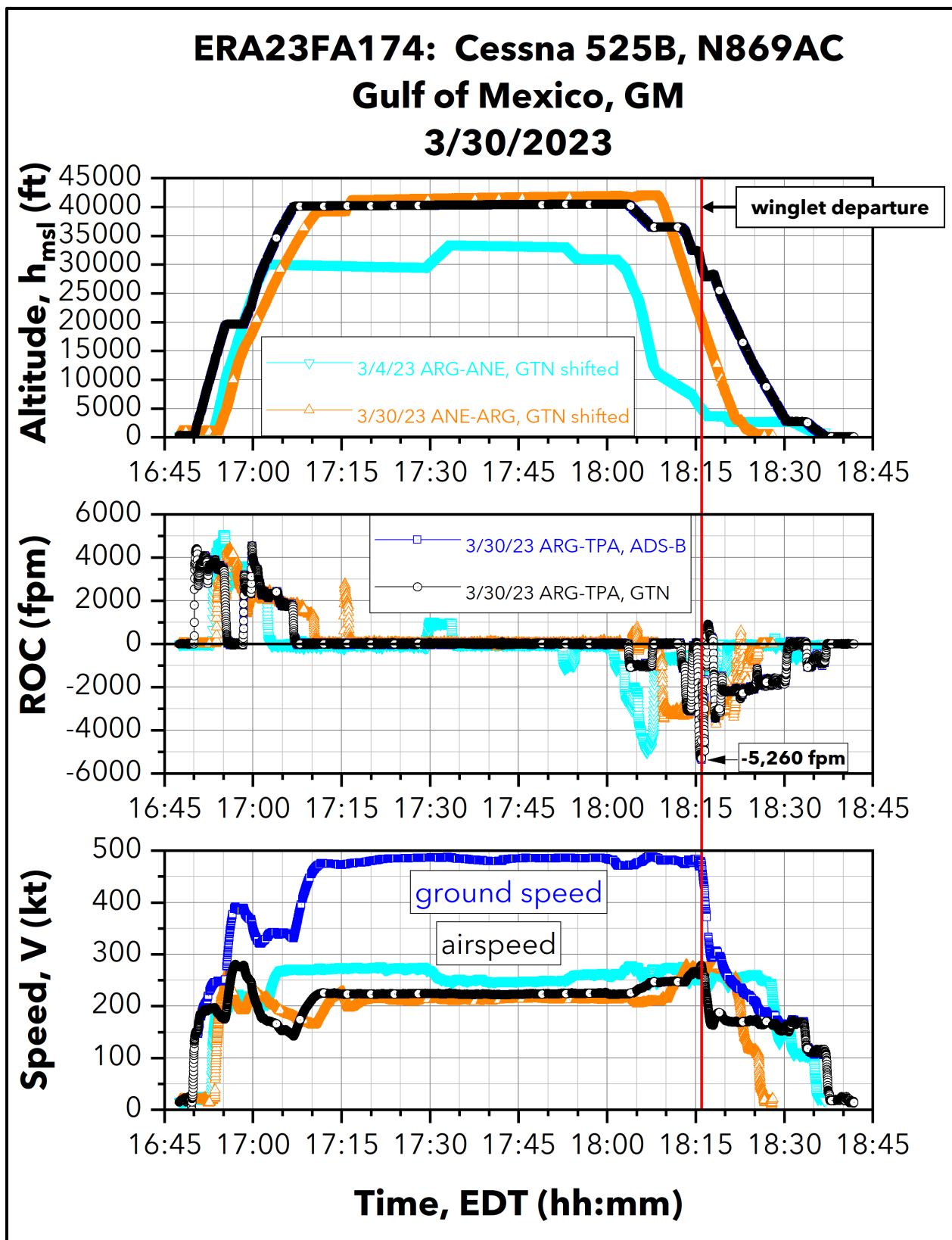
## H. FIGURES



**Figure 1: Accident Airplane, N869AC, a Cessna Citation 525B, Making an Emergency Landing at TPA with a Missing Left Winglet**

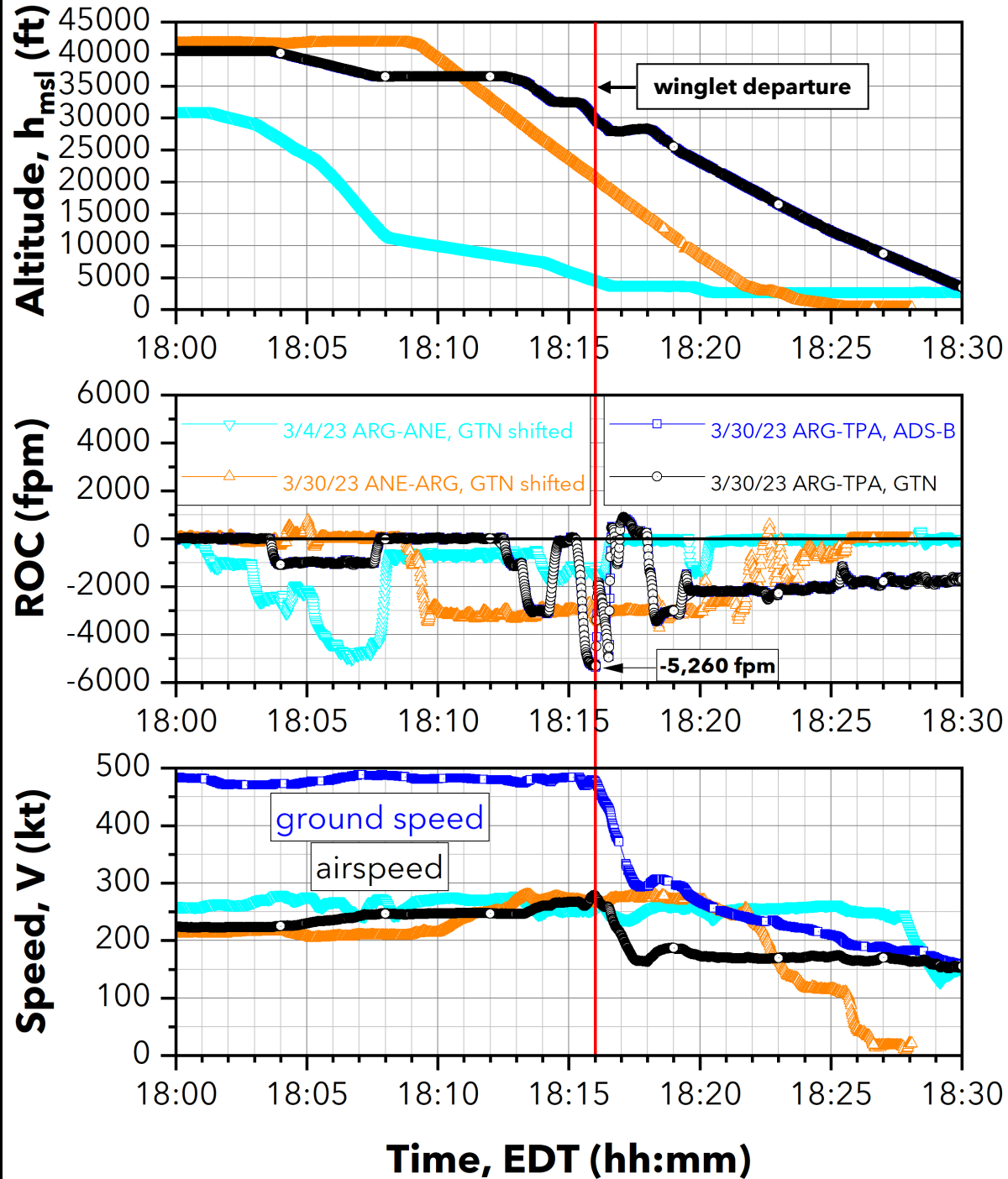


**Figure 2: Flight Legs Used in the Study for Comparison**



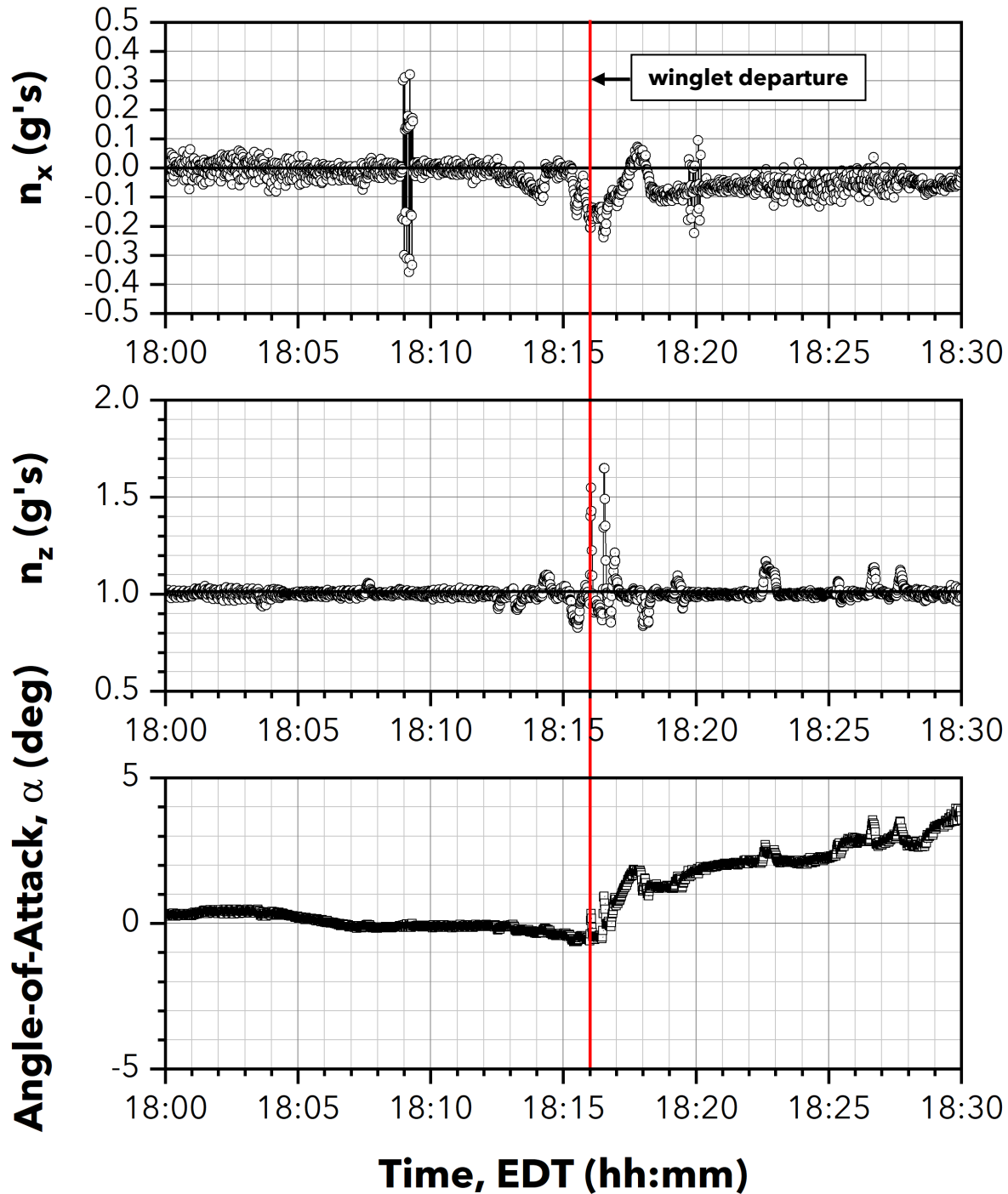
**Figure 3: Garmin and ADS-B Altitude, ROC, and Speed from Accident Flight and Previous Flights**

# **ERA23FA174: Cessna 525B, N869AC** **Gulf of Mexico, GM** **3/30/2023**

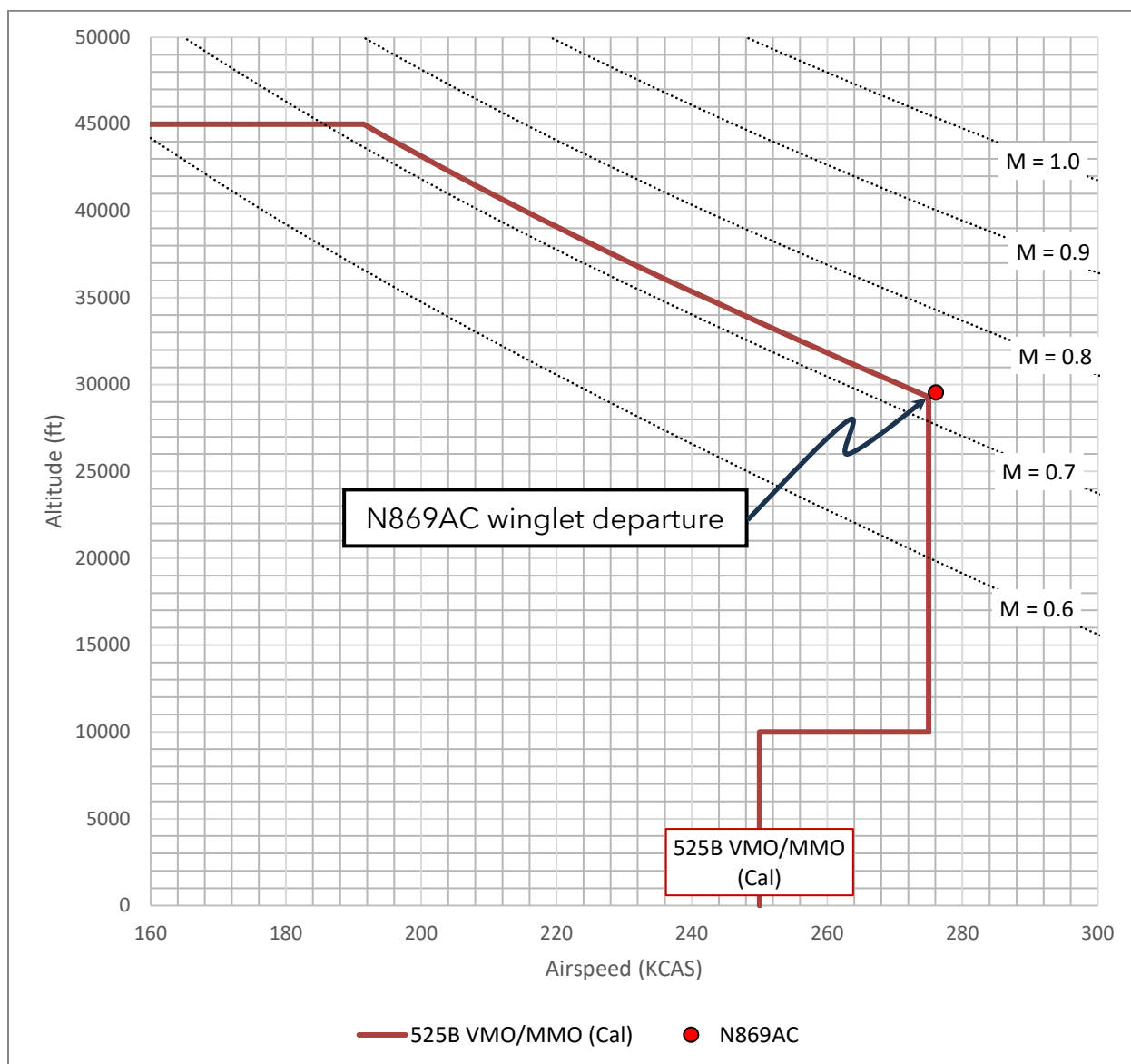


**Figure 4: Garmin and ADS-B Altitude, ROC, and Speed from Accident Flight and Previous Flights Around the Time of Winglet Departure**

**ERA23FA174: Cessna 525B, N869AC**  
**Gulf of Mexico, GM**  
**3/30/2023**



**Figure 5: Accelerations and Angle-of-Attack Estimated from Garmin Data  
Around the Time of Winglet Departure**



**Figure 6: Envelope of Cessna Citation 525B with Winglet Departure Point**