

Coordination Memo

To: Piper Accident Investigation Team

From: Piper Flight Sciences

CM No: CM46-20-0005

Rev: NEW

Date: 8/4/2020

Title: ERA19LA072 Piper Malibu N307JM Accident Investigation Support

Summary

Radar ground speed, heading, and meteorological data are used to estimate the airspeed of Piper PA-46-350P Malibu with registration number N307JM prior to and during the accident event. The analysis, given the wind speed assumptions defined below, suggests the aircraft was operating under the minimum icing speed for a time period between 6.5 and 9.5 minutes during the second climb to FL230 from FL190 with the airspeed reaching a minimum value between 75 and 88 KCAS.

The first climb was also investigated. Analysis, based on wind speed assumptions, suggests the aircraft was operating under the minimum icing speed for a time period between 5 and 11 minutes during the climb to FL190 with the airspeed reaching a minimum value between 108 and 122 KCAS.

Radar Ground Speed and Heading Data

Radar ground speed data in knots as well as heading was provided in the file 'N307JM OpsVue Tab Data.csv'.

Meteorological Data

Wind data was collected from the NTSB Meteorology Report. Page 19 states:

The wind was from 205° at 51 knots between 20,000 and 22,000 ft msl. RAOB indicated a high probability of moderate or greater clear-air turbulence between the surface and 8,000 ft msl. At the accident airplane's altitude before descent around 23,000 ft, the sounding indicated a southwest wind at 51 knots with a temperature of -16.3° C, and with a relative humidity of 89%.

The accident occurred between 0900 and 0905 EST, 2 hours after the sounding data was collected. Due to the delay between the sounding and the accident, wind speed during the second climb is estimated to be between 41 and 61 knots from 205°, +/- 10 knots from the measured wind speeds at 0700.

Wind speed estimates for the first climb are approximated between 35 and 55 KTAS from 205°.

Aircraft Weight

Aircraft weight data prior to takeoff was provided by NTSB IIC and shown in Table 1. Maximum ramp weight for the PA-46-350P is 4,358 lbs. Maximum takeoff weight is 4,340 lbs.

Table 1. Aircraft Weight Prior to Takeoff

Empty Weight	3122.4 lbs
Fuel at Takeoff – 140 gallons*	840 lbs
Pilot	198 lbs
Copilot	196 lbs
Aft Baggage	105 lbs
Total	4461.4 lbs

*Includes an additional 20 gallons with the field installed STC SA00859AT

Fuel burn during the flight is estimated based on a climb from sea level to FL190, normal cruise for 5 minutes, then climb to FL230. A constant temperature deviation from ISA of +15 degrees Celsius is assumed resulting in a calculated fuel burn of 114 lbs at the time of the accident. It is important to note that this is an estimate based on the aircraft track logs and assumes the pilot followed the recommended airspeeds, power, and mixture settings in the POH.

Subtracting the estimated fuel burn from the calculated aircraft weight before takeoff results in an estimated aircraft weight of 4347.4 lbs at the time of the incident. Assumptions in the performance calculations or the weight of ice that may have collected on the airframe could affect this number. Aircraft weight uncertainty on the order of +/- 50 lbs will result in less than 1% deviation in aircraft stall speed.

Calculated Airspeed

The aircraft heading prior to the accident was nearly constant at 0°, with wind speed from the SSW, resulting in nearly a pure tailwind and radar ground speeds faster than aircraft airspeeds. The exact tailwind component for each time step in the radar data is calculated and used to estimate the aircraft's airspeed.

True airspeeds are converted to calibrated airspeeds in order to compare to the minimum icing speed provided in the PA-46-350P POH. Stall speed, corrected for weight, in the flaps up configuration with no ice is also shown. It is important to note that stall speed will increase with any ice accumulation on the aircraft's wing.

Figure 1 and Figure 2 show the results of these calculations.

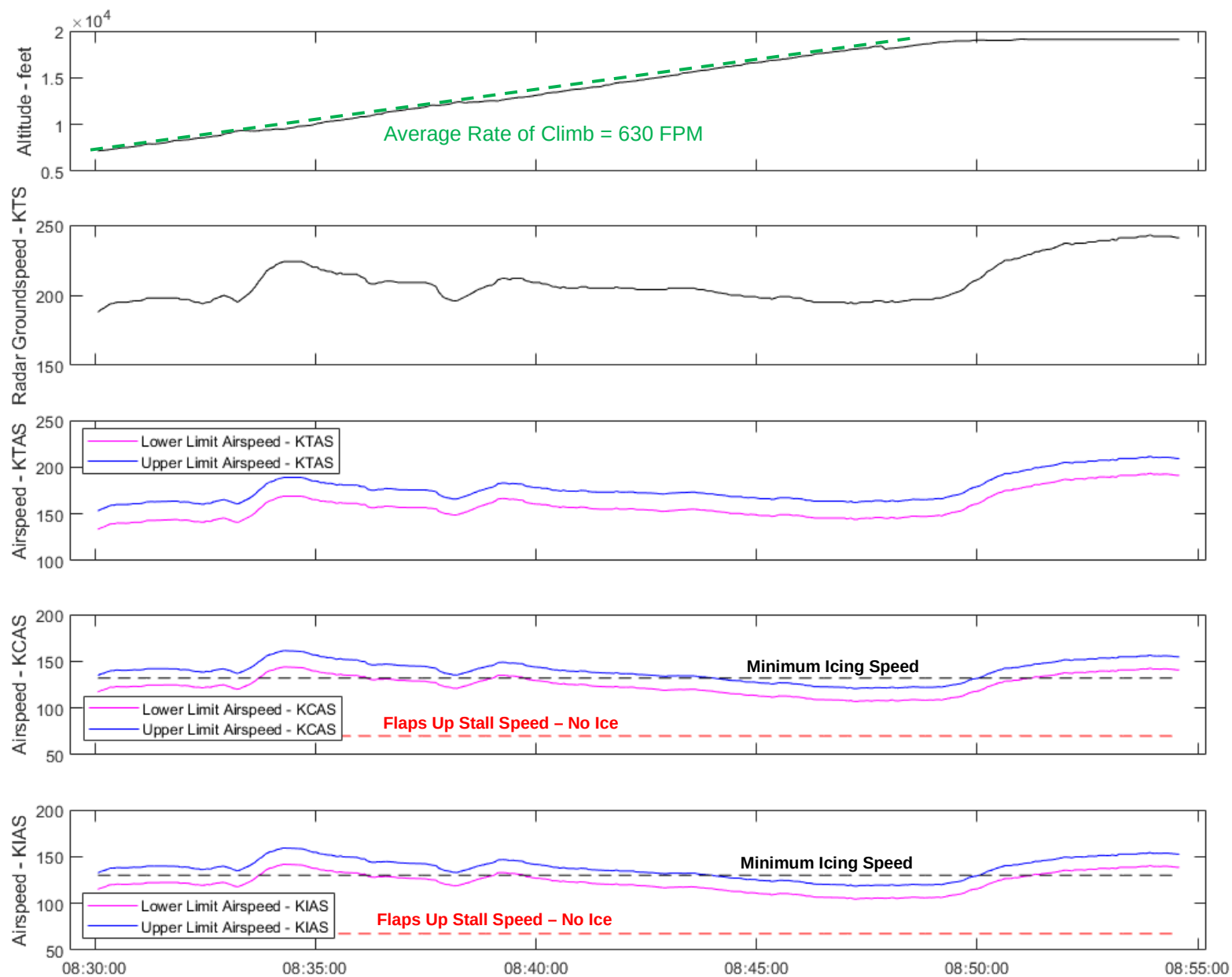


Figure 1. Aircraft Airspeed Calculations – First Climb

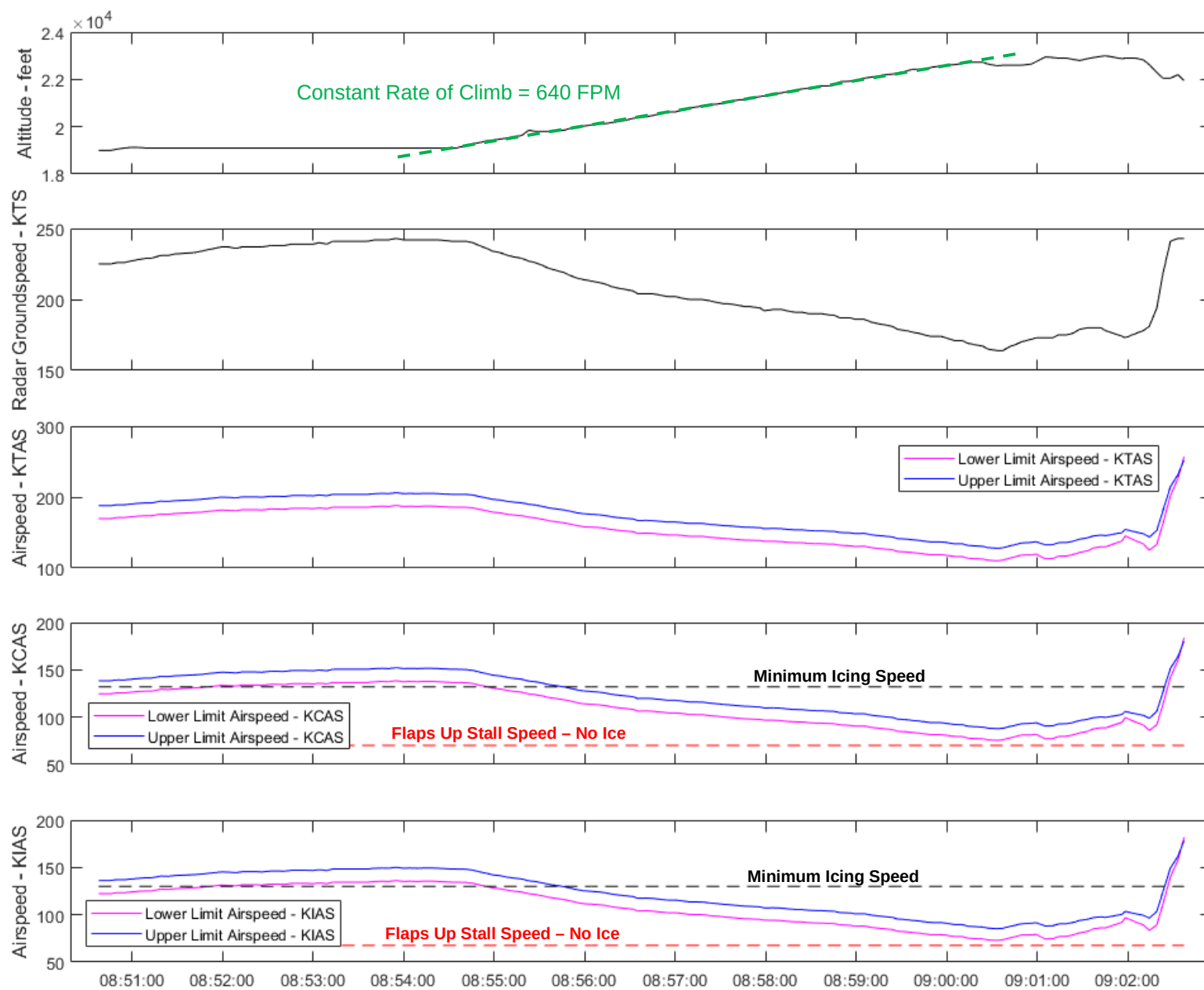


Figure 2. Aircraft Airspeed Calculations – Second Climb