Aviation Investigation Final Report

Location:	Leicester, Massachusetts	**Accident Number:**	ERA21LA122
Date & Time:	February 2, 2021, 16:55 Local	**Registration:**	N221ST
Aircraft:	Piper PA46	**Aircraft Damage:**	Substantial
Defining Event:	Structural icing	**Injuries:**	2 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that, while descending through clouds and beginning the instrument approach, some ice accumulated on the wings and he actuated the deice boots twice. The pilot saw the deice boots functioning normally on the wings and could not see the tail; however, the elevator began to shake, and he lost elevator control. The pilot applied forward pressure on the yoke and had to trim nose-down to avoid a stall. There were no cockpit caution indications and the pilot had disengaged the autopilot before descent. The airplane descended through the clouds and impacted a tree before coming to rest upright in a grass area.

Postaccident examination of the wreckage, including component testing of the deice system, did not reveal any preimpact mechanical malfunctions. The flap jackscrew position suggested that the flaps were likely in transit between 0° and 10° flap extension at the time of impact. Review of radar data revealed that, during the 2 minutes before the accident, the airplane's groundspeed averaged about 82 knots; or an approximate average airspeed of 94 knots when accounting for the winds aloft. Current weather observations and forecast weather products indicated that the airplane was likely operating in an area where moderate and potentially greater structural icing conditions prevailed, and where there was the potential for the presence of supercooled liquid droplets. Review of the pilot operating handbook for the airplane revealed that the minimum speed for flight in icing conditions was 130 knots indicated airspeed. It is likely that the pilot's failure to maintain an appropriate speed for flight in icing conditions resulted in insufficient airflow over the ice contaminated elevator and the subsequent loss of elevator control.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's failure to maintain the minimum airspeed for flight in icing conditions, which resulted in a loss of elevator control during approach due to ice accumulation.

Findings

Personnel issues	Task monitoring/vigilance - Pilot
Environmental issues	Conducive to structural icing - Compliance w/ procedure
Aircraft	Airspeed - Not attained/maintained

Factual Information

History of Flight

Approach-IFR initial approach	Structural icing (Defining event)
Approach-IFR initial approach	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On February 2, 2021, about 1655 eastern standard time, a Piper PA-46-350P, N221ST, was substantially damaged when it was involved in an accident near Leicester, Massachusetts. The commercial pilot sustained minor injuries and the two passengers were seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot stated that he received weather briefings via flight service and ForeFlight. The flight service specialist advised the pilot that there would be some icing in clouds, with cloud tops near 6,000 ft mean sea level msl (msl). Additionally, an AIRMET was in effect for moderate icing from the freezing level up to 18,000 ft msl. The pilot further stated that his previous flight that day, from Worcester, Massachusetts, to Martha's Vineyard, Massachusetts, was uneventful. He added that the actual conditions were better than forecast with no ice observed during that flight and the accident flight, until descent for the RNAV (GPS) RWY11 approach to Worcester.

Light freezing rain was reported in the area of the accident site around the time of the accident, and the forecast icing potential indicated a 60% probability of supercooled liquid droplets (SLD) over the accident site, at the time of the accident, at 4,000 ft msl. The current icing potential indicated a 90% to 100% probability of SLD at 1,000 to 4,000 ft msl at the accident site, at 1700.

The pilot reported that, while descending through clouds and beginning the approach, a little ice built up on the wings and he actuated the deice boots twice. The pilot observed the deice boots functioning normally on the wings and could not see the tail. He reported that the elevator "began to shake and became ineffective" and that he "felt like the airplane was approaching a stall." The pilot applied forward pressure on the yoke and had to trim elevator nose down to get the airplane to descend and avoid a stall, and he reported that any effort to pull back on the yoke exacerbated the situation. He further stated that no caution annunciators illuminated, and that he had disengaged the autopilot before descent. The airplane descended through the clouds and the pilot flew toward trees to avoid a house. The airplane subsequently contacted a tree and came to rest upright in the front yard of a residence about 3 miles from the runway threshold.

Examination of the wreckage did not reveal evidence of any preimpact mechanical malfunctions. Flight control continuity was confirmed from the cockpit to all control surfaces. The flap lever was observed at the 10° flap extension position. Examination of the flap

jackscrew revealed about five exposed threads, which corresponded to a flap position between 0° and 10°. Component testing of the deice system did not reveal any anomalies.

Review of air traffic control audio and radar data revealed that the pilot contacted the tower controller at 1653 and reported a position of 1 mile from the RILOC intersection (about 6.5-mile final approach). The controller acknowledged the report and cleared the pilot to land. From that time until the flight upset about 2 minutes later, the airplane's groundspeed averaged about 82 knots, or an airspeed of 94 knots based on a winds aloft forecast of 060° at 17 knots, at 3,000 ft msl.

Review of a pilot operating handbook (POH) for the airplane make and model revealed a minimum speed for flight in icing conditions as 130 knots indicated airspeed. The POH further stated, "The ice protection system was not designed or tested for flight in freezing rain, freezing drizzle or supercooled liquid water and ice crystals, or conditions defined as severe. Flight in these conditions is prohibited and must be avoided."

Pilot Information

Certificate:	Commercial	**Age:**	63,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	April 19, 2019
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 17, 2020
Flight Time:	3000 hours (Total, all aircraft), 630 hours (Total, this make and model), 2875 hours (Pilot In Command, all aircraft), 67 hours (Last 90 days, all aircraft), 28 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N221ST
Model/Series:	PA46 350P	**Aircraft Category:**	Airplane
Year of Manufacture:	2014	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4636651
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	September 2, 2021 Annual	**Certified Max Gross Wt.:**	4300 lbs
Time Since Last Inspection:	114 Hrs	**Engines:**	1
Airframe Total Time:	946 Hrs at time of accident	**Engine Manufacturer:**	
ELT:	C126 installed, not activated	**Engine Model/Series:**	
Registered Owner:	Forza Management Co	**Rated Power:**	
Operator:	Forza Management Co	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ORH,1009 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	16:42 Local	**Direction from Accident Site:**	8°
Lowest Cloud Condition:		**Visibility**	5 miles
Lowest Ceiling:	Overcast / 1100 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots / 21 knots	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	20°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.32 inches Hg	**Temperature/Dew Point:**	-1°C / -3°C
Precipitation and Obscuration:	Light - Freezing - Rain		
Departure Point:	Vineyard Haven, MA (MVY)	**Type of Flight Plan Filed:**	IFR
Destination:	Worcester, MA (ORH)	**Type of Clearance:**	IFR
Departure Time:	16:15 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Worcester Regional Airport ORH	**Runway Surface Type:**	Asphalt
Airport Elevation:	1009 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	11	**IFR Approach:**	RNAV
Runway Length/Width:	7001 ft / 150 ft	**VFR Approach/Landing:**	Straight-in

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Serious	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Serious, 1 Minor	**Latitude, Longitude:**	42.276667,-71.959444(est)

Administrative Information

Investigator In Charge (IIC):	Gretz, Robert
Additional Participating Persons:	Joe Pezzanite; FAA/FSDO; Enfield, CT Damian Galbraith; Piper Aircraft; Vero Beach, FL Ryan Enders; Lycoming Engines; WIlliamsport, PA
Original Publish Date:	November 1, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=102592