



Aviation Investigation Final Report

Location:	Fredericksburg, Virginia	Accident Number:	ERA19FA066
Date & Time:	December 14, 2018, 07:40 Local	Registration:	N350FT
Aircraft:	Eipper Quicksilver	Aircraft Damage:	Substantial
Defining Event:	Aerodynamic stall/spin	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The commercial pilot was operating an experimental amateur-built airplane on a personal flight in the airport traffic pattern. Video and audio recovered from an airframe-mounted camera, along with track data recorded by two onboard GPS receivers, revealed that, during the initial climb, the throttle was reduced, and then increased back to climb engine power for the upwind and crosswind legs of the traffic pattern. As the airplane turned toward the downwind leg at an altitude of about 300 feet, the throttle was reduced, increased briefly, and then was reduced again to what sounded consistent with an idle setting. The video and GPS track data showed that rather than aligning with the downwind leg of the traffic pattern, the airplane continued in a tightening, steepening, left turn with the engine at idle power. The airplane's last GPS-recorded position was over the accident site. The GPS data also showed that the airplane's groundspeed during the turn was near the airplane's published/placarded stall speeds. Just before ground impact, the video camera recorded a "pop" sound consistent with activation of the airplane's ballistic recovery system parachute. Postaccident examination of the airframe and engine revealed no preimpact mechanical anomalies that would have precluded normal operation.

The pilot had purchased the airplane about 3 months before the accident. At the time of purchase, the airplane had an open-cockpit, tubular-framed configuration. The pilot subsequently enclosed the open cockpit using PVC tubing, sheets of plexiglass, and zip ties. The investigation could not determine whether the cockpit modifications affected the handling and stall characteristics of the airplane. These modifications notwithstanding, the GPS data showed that the airplane was operating at or near its stall speed, had entered a tight left turn, and had likely encountered an aerodynamic stall before it descended to ground impact.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's exceedance of the airplane's critical angle of attack, which led to an aerodynamic stall while turning in the traffic pattern at low altitude.

Findings

Personnel issues

Aircraft control - Pilot

Aircraft

Angle of attack - Not attained/maintained

Factual Information

History of Flight

Approach-VFR pattern crosswind	Aerodynamic stall/spin (Defining event)
Approach-VFR pattern crosswind	Collision with terr/obj (non-CFIT)

On December 14, 2018, at 0740 eastern standard time, an experimental amateur-built Quicksilver MXL II, N350FT, was substantially damaged after it impacted terrain near Shannon Airport (EZF), Fredericksburg, Virginia. The commercial pilot was fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight, which originated around 0738. The personal flight was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91.

Airport surveillance video depicted the accident airplane as it took off from runway 24 at EZF, and showed a flight path consistent with the upwind, and crosswind legs of the traffic pattern before the airplane flew out of the camera's view.

Track data downloaded from two GPS receivers recovered from the accident site depicted a ground track consistent with that on the video. The track data showed that the initial climb and crosswind leg were flown at a groundspeed of about 50 knots. The airplane reached a GPS altitude of 322 ft and a groundspeed of about 51 knots before the airplane began to turn to the left. The left turn continued from the crosswind to downwind legs. At that point, the airplane should have been parallel with the runway, but instead the radius of the turn continued to tighten. The airplane descended to 285 ft and slowed to a groundspeed of 29 knots, which was the airplane's last recorded GPS position; at that time, the airplane was above the accident site.

An airframe-mounted video camera recovered at the accident site captured the airplane taxiing and departing on the accident flight. The engine sounds that were recorded indicated that it was running smoothly on the ground and during flight through multiple power changes. During the initial climb, the throttle was reduced from climb power and then was increased back to climb power for the upwind and crosswind legs of the traffic pattern. As the airplane turned toward the downwind leg, the throttle was reduced, increased briefly, and reduced again to a sound consistent with the idle setting. The video also showed that the airplane continued in a tightening, steepening, left turn with the engine at idle power. Just before ground impact, a "pop" sound, consistent with activation of the airplane's ballistic recovery system (BRS) parachute, was recorded.

Pilot Information

Certificate:	Commercial; Flight instructor	Age:	34, Male
Airplane Rating(s):	Single-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 single-engine	Toxicology Performed:	Yes
Medical Certification:	Class 2 Without waivers/limitations	Last FAA Medical Exam:	June 2, 2016
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	342.3 hours (Total, all aircraft), 4 hours (Total, this make and model), 1.1 hours (Last 90 days, all aircraft), 0 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

According to Federal Aviation Administration (FAA) records, the pilot held a commercial pilot certificate with ratings for airplane single-engine land and instrument airplane.

Examination of the pilot's logbook revealed the pilot had logged 342.4 total hours of flight experience. The most recent flight logged was 1.1 hours on September 10, 2018 in a Diamond DA-20 airplane. The pilot had not logged any flight experience in the accident airplane.

Aircraft and Owner/Operator Information

Aircraft Make:	Eipper	Registration:	N350FT
Model/Series:	Quicksilver MXLII	Aircraft Category:	Airplane
Year of Manufacture:	2008	Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	0936
Landing Gear Type:	Tricycle	Seats:	2
Date/Type of Last Inspection:	May 30, 2018 Condition	Certified Max Gross Wt.:	
Time Since Last Inspection:	4 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	411 Hrs at time of accident	Engine Manufacturer:	Rotax
ELT:	Not installed	Engine Model/Series:	582
Registered Owner:		Rated Power:	64 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

According to Federal Aviation Administration (FAA) records, the airplane was manufactured from a kit and purchased by the pilot in September 2018 from the builder. It had a high-wing, tubular-framed, open-cockpit configuration. The Rotax 582, 64-horsepower engine was mounted above the wing and drove a fixed-pitch propeller aft of the trailing edge of the wing in a pusher configuration. The manufacturer of the Quicksilver MXL II kit published a stall speed (Vs) for the airplane model of 32 mph (27 knots). A placard affixed to the accident airplane listed the stall speed at 27 mph (24 knots).

The accident pilot purchased the airplane from the builder in September 2018. According to witness statements, photographs, and the airport surveillance video, the accident pilot had enclosed the cockpit. He affixed, using zip ties, a frame of PVC tubing to the airplane's tubular aluminum structure, and sheets of plexiglass were affixed to the PVC tubing to form the windshield and hinged doors attached on both sides of the cockpit.

The "digital tach & hourmeter" located in the airplane at the scene indicated 411 aircraft hours.

The maintenance records for the airplane were not recovered. According to the previous owner and builder of the airplane, the most recent conditional inspection was completed in May 2018. At the time of the sale, 407 hours had accrued on the hourmeter.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KEZF, 85 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	07:35 Local	Direction from Accident Site:	287°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Overcast / 7000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.42 inches Hg	Temperature/Dew Point:	1°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Fredericksburg, VA (EZF)	Type of Flight Plan Filed:	None
Destination:	Fredericksburg, VA (EZF)	Type of Clearance:	None
Departure Time:	07:38 Local	Type of Airspace:	Class G

At 0735, weather recorded at EZF included an overcast ceiling at 7,000 ft, visibility 10 miles, and calm winds. The temperature was 1° C, the dew point was 1° C; and the altimeter setting was 30.42 inches of mercury.

Airport Information

Airport:	Shannon EZF	Runway Surface Type:	Asphalt
Airport Elevation:	80 ft msl	Runway Surface Condition:	Dry
Runway Used:	24	IFR Approach:	None
Runway Length/Width:	2999 ft / 100 ft	VFR Approach/Landing:	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	38.259166,-77.444442(est)

The airplane came to rest in a nose-down attitude on flat terrain, and all major components were accounted for at the scene. The wreckage path from the initial ground scar to the main wreckage was 27 ft long and was oriented along a magnetic heading of 115°. The BRS parachute was partially deployed and remained attached to the airframe by a steel cable with a bridle loop around the main structural beam (root tube) beneath the engine. The cable was traced from the bridle loop, through multiple wraps around the engine driveshaft and propeller flange, to the parachute. The expended ballistic parachute rocket and deployment bag were located 105 ft northwest of the main wreckage.

The airplane rested on the leading edges of both wings, which were uniformly crushed in a chordwise direction. The tail, elevators, and rudder were intact and mostly undamaged with the empennage tubing bent forward over the cockpit area. All lifting and flight control surfaces remained attached to the airframe. The airframe tubing displayed bends and fractures consistent with impact and overstress failure. Flight control continuity was confirmed from the flight controls to all flight control surfaces.

The engine was largely undamaged. The wooden propeller was shattered about 8 inches outboard of the hub on one blade and was fractured spanwise on the other blade. Propeller fragments at the accident site displayed concave, leading-edge damage consistent with the dimensions of the BRS steel cable.

Further examination of the engine found that the carburetor float bowls displayed some internal corrosion and debris and that the vent lines were obstructed. For a test run, the obstructed vent lines remained, but the fuel lines were replaced because they were found to be "old." The engine, after being placed in a test stand, started on the first pull of the rope starter. The engine ran smoothly and continuously at multiple power settings without interruption for several minutes. At the completion of the test run, the throttle was reduced quickly, and the engine transitioned to idle power smoothly before the engine was stopped with the engine controls. After a replacement propeller was installed, the engine was manually rotated at the propeller, and continuity was confirmed throughout.

Examination of the airframe and engine revealed no preimpact mechanical anomalies that would have precluded normal operation.

Medical and Pathological Information

The Virginia Department of Health, Office of the Chief Medical Examiner, Richmond, Virginia, performed an autopsy of the pilot and determined the cause of death as "blunt force trauma."

The FAA Forensic Sciences Laboratory performed toxicological testing on the pilot. The test results

were negative for the presence of carbon monoxide, drugs, and alcohol.

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Amber White; FAA FSDO; Richmond, VA
Original Publish Date:	June 3, 2020
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=98770

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).