Aviation Investigation Final Report

Location:	Johns Island, South Carolina	**Accident Number:**	ERA23FA164
Date & Time:	March 25, 2023, 12:51 Local	**Registration:**	N21480
Aircraft:	Piper PA-28-161	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The non-instrument-rated pilot was on his second day of a long cross-country flight. The first night of his trip he slept in a pilot lounge at an en route airport. He departed the following morning and made one stop for fuel. During the fuel stop, pilot spoke with an airport employee, who said the pilot appeared tired. The pilot said he had been fighting a strong headwind the entire trip. The pilot checked the airport's automated weather observation system (AWOS) and told the employee that he might stay the night and wait out the approaching weather; however, he ultimately decided to continue his flight.

After takeoff, the pilot climbed to 1,600 ft mean sea level (msl) and told air traffic control that he wanted to stay low to maintain visual flight rules (VFR) and avoid any clouds. A short while later, the controller observed the airplane in a descending right turn, and asked the pilot if he was maneuvering to stay below the clouds. The pilot responded, "Mayday Mayday…in the clouds…I'm going down." The airplane impacted swampy terrain in a nose-down attitude.

Postaccident examination of the airplane revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation of the engine or airframe.

A review of archived information revealed the pilot did not obtain a documented weather briefing on the day of the accident. However, he was aware that the weather conditions along his route of flight would deteriorate and expressed that he may have to delay the trip. A postaccident review of weather information indicated the pilot encountered an area of clouds with tops about 3,500 ft msl.

The pilot decided to continue with the flight, and based on available evidence, was unable to maintain visual conditions and entered a cloud layer, losing visual reference to his surroundings. As such, the pilot likely became spatially disoriented and lost control of the airplane. It is also possible that the pilot was experiencing some level of fatigue at the time of the accident due to the long flights over the preceding days and the less-than-optimal sleeping conditions the night before. Fatigue has been shown to reduce one's judgement and degrade performance, and it is likely that fatigue contributed to the pilot's decision to continue the flight into deteriorating weather conditions.

Probable Cause and Findings

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

The pilot's decision to continue flight under visual flight rules into instrument meteorological conditions, which resulted in the pilot's spatial disorientation and loss of control. Contributing to the accident was the pilot's degraded judgement and performance due to fatigue.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Spatial disorientation - Pilot
Personnel issues	(general) - Pilot

Factual Information

History of Flight

Enroute	Loss of control in flight (Defining event)
Uncontrolled descent	VFR encounter with IMC

HISTORY OF FLIGHT

On March 25, 2023, at 1251 eastern daylight time, a Piper PA-28-161, N21480, was substantially damaged when it was involved in an accident near John's Island, South Carolina. The private pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The non-instrument-rated pilot was traveling from Maine to Florida to meet friends at the annual Sun 'n Fun Aerospace Expo in Lakeland, Florida. A review of air traffic control communications and ADS-B flight tracking data revealed he departed Machias, Maine, about 0820, made two fuel stops, and landed at the Tarboro – Edgecombe Airport (ETC), Tarboro, North Carolina, about 1800. According to the pilot's wife, the pilot spent the night at ETC in the pilot's lounge. The following morning, about 0814, he departed for the Conroy-Horry County Airport (HYW), Conroy, South Carolina, and landed about 1043.

According to an employee at HYW, the pilot said that he was headed to Sun 'n Fun and had been fighting a strong headwind the entire trip. The pilot appeared tired, and the employee could see "fatigue in his eyes." The pilot checked the AWOS and mentioned that he might stay the night and wait out the approaching weather. However, the employee saw the pilot walk out to his airplane, check the fuel, and depart.

The pilot departed HYW at 1156 for the Palatka Municipal Airport (28J) Palatka, Florida, and climbed to an altitude of 1,600 ft msl. He was in contact with air traffic control and receiving flight following services. At 1243, a controller asked the pilot if he wanted to remain at 1,600 ft msl or climb to a higher altitude. The pilot said that he wanted to stay low to maintain VFR "due to any clouds up ahead." A controller acknowledged and said, "maintain VFR, altitude your discretion." At 1251, a controller noticed the airplane started to turn right and descend. The controller asked the pilot if he was maneuvering to stay below the clouds. The pilot responded, "Mayday Mayday…in the clouds…I'm going down." This was the last communication from the pilot.

A witness heard the airplane's engine and looked up. He said the airplane was descending straight down, nose first at a high rate of speed. When the airplane impacted the marsh, he could see mud fly up. The witness said the engine sounded like it was "popping." He said the weather was overcast with low clouds like when it rains.

Another witness heard a high-pitched whining noise and looked up just after the airplane impacted the marsh across from where he was launching his boat. Mud was flying up in the air. He heard several "chopping" sounds, which he believed was the noise of the propeller chewing up the marsh and the mud. The witness said the airplane sounded like a World War II dive-bomber, with the engine whining at a high pitch. He said the weather was overcast "almost as if it was going to rain."

METEOROLOGICAL INFORMATION

Review of weather information indicated that the accident site was located just east of an outflow boundary. Satellite imagery indicated that a 2-mile-wide, 10- to 15-mile-long area of clouds extended along the coastline in the area of the accident site, with cloud tops about 3,500 ft msl. A Graphical Forecast for Aviation cloud forecast, issued at 1100 and valid for the accident time, forecasted cloud bases around 2,100 ft msl in the area of the accident site. A High-Resolution Rapid Refresh model sounding for the accident site depicted unstable to conditionally unstable atmospheric conditions from the surface to 1,000 ft. A text-AIRMET and a graphical or G-AIRMET were also issued for moderate turbulence conditions. The weather conditions were forecast to worsen with the approaching thunderstorm activity an hour or two after the accident timeframe.

An automated surface observation from Charleston Executive Airport (JZI), located about 2 miles north-northeast of the accident site, at 1235, reported broken cloud layers at 1,300 ft and 1,700 ft above ground level (agl) with 10 statute miles visibility. The 1255 observation reported an overcast ceiling at 1,300 ft agl and 10 statute miles visibility.

Review of archived information indicated that the pilot did not request a weather briefing through Leidos Flight Service. According to information provided by ForeFlight, the pilot accessed his ForeFlight account and updated the route about 1130 on the day of the accident; however, he did not file a flight plan or obtain a weather briefing through the service.

PILOT INFORMATION

The pilot held a private pilot certificate with a rating for airplane single-engine land. He did not have an instrument rating. His last Federal Aviation Administration (FAA) third-class medical certificate was issued on March 3, 2022. At that time, he reported a total of 740 flight hours. The pilot's logbook was never located.

WRECKAGE INFORMATION

The airplane impacted a marsh and was embedded in thick mud, water, and vegetation. The disposition of the airplane was consistent with it impacting the ground in a nose-low attitude at a high rate of speed. There was no postimpact fire. First responders reported fuel was present in and around the wreckage. All major components of the airplane were located at the accident site.

Postaccident examination of the airplane revealed that it sustained extensive damage from impact forces. Both wings, including the flaps and ailerons, the fuselage, and the entire tail section exhibited impact damage. Both wing fuel tanks were breached. Flight control continuity was established for each flight control surface to the cockpit area. The manual flap selector handle was loose but still connected by a cable. The flap handle was found in the third notch of flaps position. Due to impact damage, it was not possible to check the flap chain/sprocket system to confirm the flap position noted on the selector handle.

The fuselage and cockpit area were crushed. The attitude indicator and directional gyros were recovered and disassembled. No scoring was noted on the interior of either gyro housing.

Examination of the engine revealed that the exhaust muffler, carburetor, alternator, and oil sump were not observed among the recovered wreckage. The vacuum pump remained attached to the engine and no damage was noted. The pump was partially disassembled, and no damage was noted to the composite drive assembly, carbon rotor, or carbon vanes.

The top spark plugs were removed and gray in color consistent with normal wear per the Champion Check-a-Plug chart. The Nos. 1 and 4 bottom spark plugs exhibited normal condition. Nos. 2 and 3 bottom spark plugs were impact damaged. The ignition harness was impact destroyed.

The engine’s crankshaft was manually rotated by turning the crankshaft flange. Continuity of the crankshaft to the rear accessory gears and to the valvetrain was established, as was compression and suction to all four cylinders. Mud and water were observed inside the engine crankcase and cylinders. The interiors of the cylinders were evaluated using a lighted borescope and no anomalies were noted other than water, mud, and corrosion byproducts.

No evidence of any preimpact mechanical malfunctions or failures were observed that would have precluded normal operation of the engine or airframe at the time of impact.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was conducted by the Charleston County Coroner’s Office. The cause of death was determined to be “Multiple blunt force injuries due to airplane crash.” The manner of death was an accident.

Toxicology testing performed at the FAA Forensic Sciences Laboratory detected the cholesterol drug atorvastatin and the blood pressure drug lisinopril in the pilot’s heart blood. Neither drug is generally considered to be impairing.

ADDITIONAL INFORMATION

The pilot’s sleep-wake history in the days preceding the accident could not be determined. Although the time of day when the accident occurred was not a time particularly associated with fatigue, due to the pilot's long distance flying over two days, mention of fighting a headwind for much of the trip, and less-than-optimal sleeping arrangements the night before the accident, it is possible that the pilot was experiencing some fatigue at the time of the accident. This is consistent with the HYW employee's report that the pilot appeared tired the morning of the accident. Fatigue has been shown to reduce one's judgment and degrade performance.

According to the FAA Flight Training Handbook, Advisory Circular (AC) 61-21A, page 9, "The flight attitude of an airplane is generally determined by reference to the natural horizon. When the natural horizon is obscured, attitude can sometimes be maintained by reference to the surface below. If neither horizon or surface references exist, the airplane's attitude must be determined by artificial means - an attitude indicator or other flight instruments. Sight, supported by other senses such as the inner ear and muscle sense, is used to maintain spatial orientation.

However, during periods of low visibility, the supporting senses sometimes conflict with what is seen. When this happens, a pilot is particularly vulnerable to spatial disorientation," and this vulnerability could be exacerbated by fatigue.

Pilot Information

Certificate:	Private	**Age:**	66,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	March 9, 2022
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	740 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N21480
Model/Series:	PA-28-161	**Aircraft Category:**	Airplane
Year of Manufacture:	1978	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	28-7916043
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	March 16, 2023 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	3792.88 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-320-03G
Registered Owner:	PATTERSON ANDREW F	**Rated Power:**	160 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KJZI,17 ft msl	**Distance from Accident Site:**	1.6 Nautical Miles
Observation Time:	12:55 Local	**Direction from Accident Site:**	11°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Overcast / 1300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots / 18 knots	**Turbulence Type Forecast/Actual:**	Terrain-Induced / None
Wind Direction:	200°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	22°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Conway, SC (HYW)	**Type of Flight Plan Filed:**	None
Destination:	Palatka, FL (28J)	**Type of Clearance:**	VFR;VFR flight following
Departure Time:	12:10 Local	**Type of Airspace:**	Class D

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	32.669302,-80.010379(est)

Administrative Information

Investigator In Charge (IIC):	Read, Leah
Additional Participating Persons:	Charles Lewis; FAA/FSDO; Columbia, SC Jonathon Hirsch; Piper; Vero Beach, FL Mike Childers; Lycoming
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