



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Lincolnton, North Carolina	<b>Accident Number:</b>	ERA18FA197
<b>Date &amp; Time:</b>	July 24, 2018, 05:21 Local	<b>Registration:</b>	N38523
<b>Aircraft:</b>	Piper PA32R	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	VFR encounter with IMC	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

The noninstrument-rated private pilot and one passenger departed on a personal cross-country visual flight rules flight in dark night instrument meteorological conditions (IMC) that included 1 1/2 statute miles visibility in mist and an overcast cloud layer 200 ft above ground level. The pilot did not obtain an official weather briefing before departing on the flight, and what preflight weather information he may have obtained could not be determined. Onboard data indicated that the airplane departed, entered a climbing left turn to a downwind leg for the runway, and about 1 minute after takeoff, entered a rapid left turning descent that continued to ground contact. Postaccident examination of the airframe and engine did not reveal evidence of any preimpact mechanical malfunctions that would have precluded normal operation.

The restricted visibility due to the dark night and instrument conditions was conducive to the development of spatial disorientation, and the airplane's flight track was consistent with the known effects of spatial disorientation. According to a family member, the pilot stated that he was going to attend an air show and had planned to leave early in the morning for "a window of good weather." Despite not being instrument rated, the pilot likely chose to depart due to his self-induced pressure to complete the flight as planned. It is likely that the pilot's decision to depart into IMC resulted in his spatial disorientation and a subsequent loss of airplane control.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The noninstrument-rated pilot's intentional visual flight rules flight into instrument meteorological conditions, which resulted in a loss of control due to spatial disorientation. Contributing the accident was the pilot's self-induced pressure to complete the flight as planned.

## Findings

<b>Personnel issues</b>	Decision making/judgment - Pilot
<b>Personnel issues</b>	Aircraft control - Pilot
<b>Personnel issues</b>	Spatial disorientation - Pilot
<b>Personnel issues</b>	Motivation/respond to pressure - Pilot
<b>Environmental issues</b>	Below VFR minima - Decision related to condition
<b>Environmental issues</b>	Below VFR minima - Effect on personnel

# Factual Information

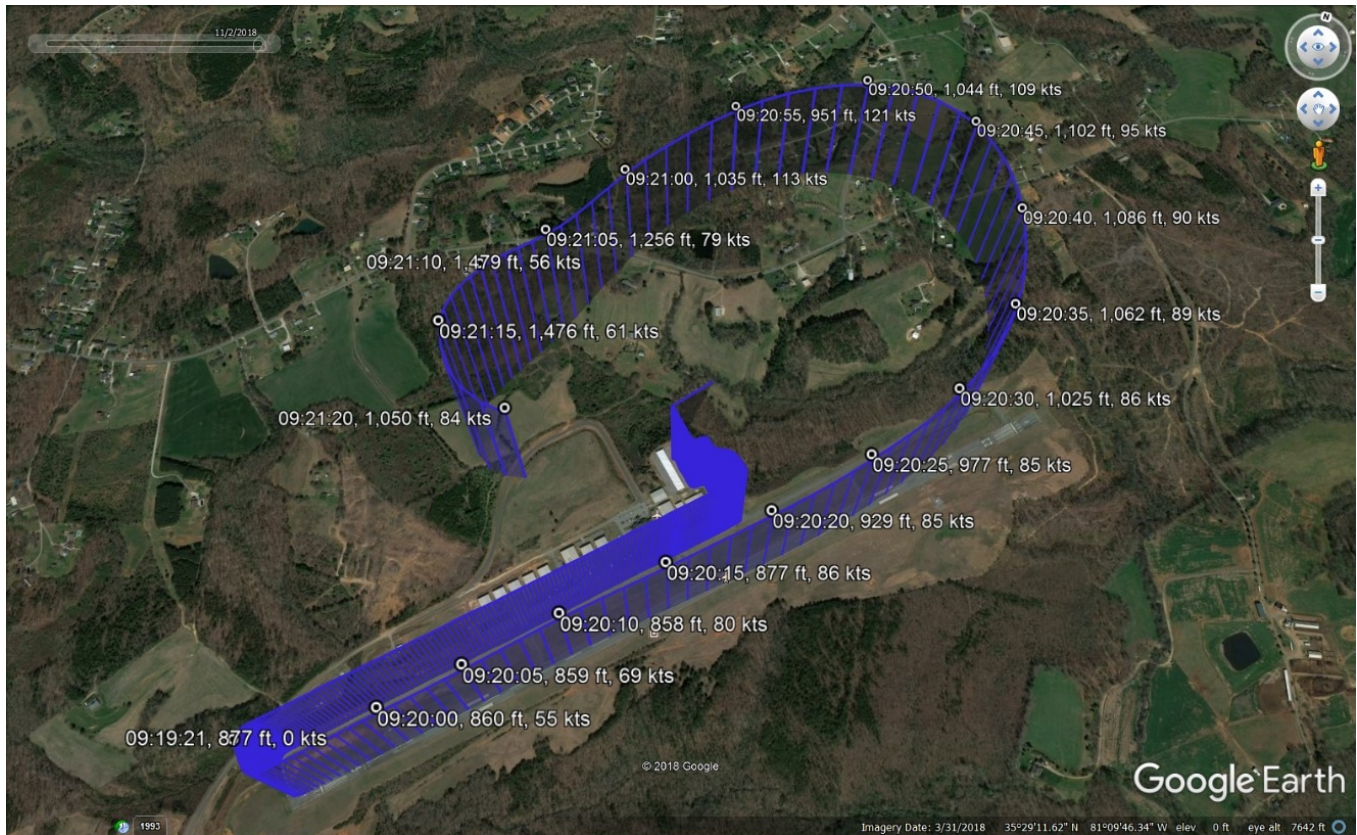
## History of Flight

Initial climb	VFR encounter with IMC (Defining event)
Initial climb	Loss of visual reference
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On July 24, 2018, about 0521 eastern daylight time, a Piper PA-32R-300, N38523, was substantially damaged when it impacted terrain shortly after takeoff from Lincolnton-Lincoln County Regional Airport (IPJ), Lincolnton, North Carolina. The private pilot and passenger were fatally injured. The airplane was privately owned and was being operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Instrument meteorological conditions prevailed in the area at the time of the accident, and no flight plan was filed for the flight, which was destined for Sheboygan County Memorial Airport (SMB), Sheboygan, Wisconsin.

According to a family member, the pilot stated that he was going to attend an air show in Oshkosh, Wisconsin, and had planned to leave early in the morning for "a window of good weather."

Data from the onboard Appareo Stratus 2S unit indicated that the airplane departed runway 05 about 0520; about 0520:25, the pilot initiated a left turn as it climbed from the runway. The airplane continued the climbing left turn to about 1,100 ft GPS altitude and a groundspeed about 95 knots, then descended to about 950 ft GPS altitude and accelerated to a groundspeed about 121 knots on an approximate left downwind leg for runway 05. About 0521:10, the airplane was about 1,480 ft GPS altitude and a groundspeed about 56 knots. The airplane subsequently entered a descending left turn; the final recorded data point captured a GPS altitude of 1,050 ft and a rate of descent greater than 4,000 ft per minute. (see Figure 1.) A witness near the accident site reported that he was sleeping when he heard a low-flying airplane followed by a "thud." He drove to the airport and located the airplane in an open field about 1/2-mile northwest of midfield.



Google Earth overlay showing accident flight track data

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	63, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Lap only
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 Waiver time limited special	<b>Last FAA Medical Exam:</b>	June 21, 2017
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	March 16, 2017
<b>Flight Time:</b>	624.2 hours (Total, all aircraft)		

The pilot held a private pilot certificate with a rating for airplane single-engine land. His most recent Federal Aviation Administration third-class special issuance medical certificate was issued on June 21, 2017, with the limitations, "Holder shall possess glasses for near and intermediate vision. Not valid for any class after June 30, 2018." The last entry in the pilot's

logbook was on December 1, 2017; as of that date, he had recorded 624.3 total hours of flight experience. According to the pilot's logbook, he had accumulated 3.3 hours of simulated instrument time as of July 18, 2014.

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Piper	<b>Registration:</b>	N38523
<b>Model/Series:</b>	PA32R 300	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1977	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	32R-7780438
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	6
<b>Date/Type of Last Inspection:</b>	July 20, 2018 Annual	<b>Certified Max Gross Wt.:</b>	3600 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	3242 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	C91 installed, not activated	<b>Engine Model/Series:</b>	IO-540-K1G5D
<b>Registered Owner:</b>		<b>Rated Power:</b>	300 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

The six-seat, low-wing, retractable-gear airplane was manufactured in 1977. It was powered by a Lycoming IO-540, 300-horsepower engine. The most recent annual inspection was completed on July 20, 2018.



## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Night/dark
<b>Observation Facility, Elevation:</b>	KIPJ, 875 ft msl	<b>Distance from Accident Site:</b>	0 Nautical Miles
<b>Observation Time:</b>	05:05 Local	<b>Direction from Accident Site:</b>	114°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	2 miles
<b>Lowest Ceiling:</b>	Overcast / 200 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	/	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.95 inches Hg	<b>Temperature/Dew Point:</b>	21°C / 21°C
<b>Precipitation and Obscuration:</b>	Moderate - None - Mist		
<b>Departure Point:</b>	Lincolnton, NC (IPJ )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Oshkosh, WI (OSH )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	05:30 Local	<b>Type of Airspace:</b>	Class G

A review of aviation weather vendors (Leidos Automated Flight Service Station (AFSS), ForeFlight, and other third-party users of the AFSS system) revealed that the pilot did not obtain an official weather briefing on the day of the accident. The pilot did not file a flight plan, and what weather information he may have obtained directly before the flight could not be determined. About 18 hours before the accident, the pilot used a ForeFlight application to view weather models for visibility and precipitation forecasts for the proposed route of flight. At that time, AIRMETs, valid for 6 hours, would not have been available all the way to the pilot's proposed departure time.

At the time of the accident, there was AIRMET Sierra warning of instrument flight rules (IFR) conditions due to precipitation, mist, and fog. AIRMET Sierra was issued at 2245 the night before the accident and reissued at 0031 and at 0217 the day of the accident.

At 0445, the weather conditions reported at IPJ included calm wind, 4 statute miles visibility in mist, overcast clouds at 200 ft agl, temperature 21°C, dew point 21°C, and an altimeter setting of 29.95 inches of mercury.

The 0505 weather conditions at IPJ included calm wind, 2 statute miles visibility in mist, overcast clouds at 200 ft agl, temperature 21°C, dew point 21°C, and an altimeter setting of 29.95 inches of mercury.

The 0525 weather conditions at IPJ included calm wind, 1 1/2 statute miles visibility in mist, overcast clouds at 200 ft agl, temperature 21°C, dew point 21°C, and an altimeter setting of 29.95 inches of mercury.

Hickory Regional Airport (HKY), located 19 miles northwest of the accident site, was the closest site with a Terminal Aerodrome Forecast (TAF). The HKY TAF forecast 6 miles visibility, mist and showers in the vicinity, and a broken ceiling of 1,500 ft agl during the hours of 0200 and 0600. Also,

temporary conditions of a broken ceiling at 300 ft agl and overcast skies at 1,000 ft agl were forecast during this time.

Astronomical data obtained from the United States Naval Observatory for the accident area indicated that the beginning of civil twilight was at 0559.

### Airport Information

<b>Airport:</b>	LINCOLNTON-LINCOLN COUNTY RGNL IPJ	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	877 ft msl	<b>Runway Surface Condition:</b>	Vegetation
<b>Runway Used:</b>	05	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	5504 ft / 100 ft	<b>VFR Approach/Landing:</b>	None

### Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	1 Fatal	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	35.484722,-81.165832(est)

The airplane was examined at the accident site; it came to rest in a shallow impact crater in a grass field. All major components of the airplane were accounted for at the scene. The wreckage path was about 170 ft long and was oriented on a 085° magnetic heading. The grass surrounding the wreckage path displayed fuel blight.

The fuselage between the engine and main wing spar was fragmented and crushed aft. The instrument panel was heavily damaged and fragmented. The wing flaps and landing gear were retracted. Flight control continuity was confirmed from all the flight control surfaces to the cockpit. The left wing was separated from the airframe and came to rest parallel to the wreckage. The right wing remained attached; the leading edge was crushed aft. The empennage remained attached and exhibited impact damage to the vertical stabilizer and stabilator.

The engine control levers were full-forward and impact damaged. The engine remained partially attached to the airframe; it was removed and suspended from a hoist for examination. A borescope examination of the cylinders revealed that the tops of all pistons and all intake and exhaust valves exhibited normal combustion signatures. The drive train was manually rotated and thumb compression was obtained on all cylinders. Continuity of the crankshaft to the rear gears and to the valve train was confirmed. The spark plugs showed normal wear. The dual magneto remained attached to the engine but was impact damaged. It produced a spark at three of the twelve towers. Internal visual examination did not reveal any pre-impact failures or malfunctions. The fuel injectors, oil pump, and oil filter were free

of debris. The fuel selector valve and gascolator were removed; both were free of obstructions and debris. The engine-driven fuel pump was fractured and partially separated from the engine; it was disassembled and no damage was noted to the internal valves or diaphragms. The vacuum pump remained attached to the engine and rotated freely by hand; the carbon rotor and carbon vanes were intact.

The three-bladed Hartzell propeller was located about 50 ft forward of the main wreckage. All three blades were bent aft and exhibited chordwise scratching and leading edge gouging; one blade also exhibited S-bending.

### **Additional Information**

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According to the FAA's General Aviation Safety Enhancement Fact Sheet on Spatial Disorientation, pilots flying under both instrument and visual flight rules are subject to spatial disorientation and optical illusions that may cause a loss of aircraft control. Sight, supported by other senses, allows a pilot to maintain orientation while flying. However, when visibility is restricted (i.e., no visual reference to the horizon or surface detected) the body's supporting senses can conflict with what is seen. When this spatial disorientation occurs, sensory conflicts and optical illusions often make it difficult for a pilot to tell which way is up.

Contributing to these phenomena are the various types of sensory stimuli: visual, vestibular (organs of equilibrium located in the inner ear), and proprioceptive (receptors located in the skin, muscles, tendons and joints). Changes in linear acceleration, angular acceleration, and gravity are detected by the vestibular system and the proprioceptive receptors, and then compared in the brain with visual information. In a flight environment, these stimuli can vary in magnitude, direction, and frequency, resulting in a sensory mismatch that can produce illusions and lead to spatial disorientation.

According to the Pilots Handbook of Aeronautical Knowledge, FAA-H-8083-25B:

*Under normal flight conditions, when there is a visual reference to the horizon and ground, the sensory system in the inner ear helps to identify the pitch, roll, and yaw movements of the aircraft. When visual contact with the horizon is lost, the vestibular system becomes unreliable. Without visual references outside the aircraft, there are many situations in which combinations of normal motions and forces create convincing illusions that are difficult to overcome.*

According to the Instrument Procedures Handbook, FAA-H-8083 (AB):

*The vestibular sense (motion sensing by the inner ear) can confuse the pilot. Because of inertia, sensory areas of the inner ear cannot detect slight changes in aircraft attitude nor can they accurately sense attitude changes that occur at a uniform rate over time. Conversely, false sensations often push the pilot to believe that the attitude of the aircraft has changed when in fact it has not, resulting in spatial disorientation.*

FAA Advisory Circular 61-134, General Aviation Controlled Flight into Terrain Awareness, stated:

*According to National Transportation Safety Board (NTSB) and FAA data, one of the leading causes of*



*GA accidents is continued VFR flight into IMC... The importance of complete weather information, understanding the significance of the weather information, and being able to correlate the pilot's skills and training, aircraft capabilities, and operating environment with an accurate forecast cannot be emphasized enough... VFR pilots in reduced visual conditions may develop spatial disorientation and lose control, possibly going into a graveyard spiral.*

FAA Advisory Circular AC 60-22, Aeronautical Decision Making, stated, "Pilots, particularly those with considerable experience, as a rule always try to complete a flight as planned, please passengers, meet schedules, and generally demonstrate that they have 'the right stuff.'" One of the common behavioral traps identified was "Get-there-itis." The text stated, "Common among pilots, [get-there-itis] clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action."

## Medical and Pathological Information

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An autopsy of the pilot was performed by the Lincoln County Medical Examiner in Lincolnton, North Carolina. The cause of death was blunt force injuries.

Toxicology testing performed at the FAA Forensic Sciences Laboratory was negative for carbon monoxide and ethanol; pravastatin (used to treat high cholesterol) was detected; it is not impairing.

## Administrative Information

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<b>Investigator In Charge (IIC):</b>	Hill, Millicent
<b>Additional Participating Persons:</b>	Paul Meyer; FAA/FSDO; Charlotte, NC Kathryn Whitaker; Piper; Vero Beach, FL Mike Childers; Lycoming Engines; Williamsport, PA
<b>Original Publish Date:</b>	April 20, 2020
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=97859">https://data.nts.gov/Docket?ProjectID=97859</a>

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](#).