Aviation Investigation Final Report

Location:	Chariton, Iowa	**Accident Number:**	CEN16FA361
Date & Time:	September 7, 2016, 12:19 Local	**Registration:**	N465JM
Aircraft:	Piper PA 46-310P	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The noninstrument-rated private pilot was conducting a visual flight rules (VFR) cross-country flight while receiving VFR flight following services from air traffic control. Radar data and voice communication information indicated that the airplane was in cruise flight as the pilot deviated around convective weather near his destination. The controller issued a weather advisory to the pilot concerning areas of moderate to extreme precipitation along his route; the pilot responded that he saw the weather on the airplane's NEXRAD weather display system and planned to deviate around it before resuming course. About 3 minutes later, the pilot stated that he was around the weather and requested to start his descent direct toward his destination. The controller advised the pilot to descend at his discretion. Radar showed the airplane in a descending right turn before radar contact was lost at 2,900 ft mean sea level. There were no eyewitnesses, and search personnel reported rain and thunderstorms in the area about the time of the accident.

The distribution of the wreckage was consistent with an in-flight breakup. Examination of the airframe revealed overload failures of the empennage and wings. No pre-impact airframe structural anomalies were found, and the propeller showed evidence of rotation at the time of impact. Further, there was no evidence of pilot impairment or incapacitation.

Review of weather information indicated that the pilot most likely encountered instrument meteorological conditions as the airplane descended during the last several minutes of flight. During this time, it is likely that the pilot became disoriented while attempting to maneuver in convective, restricted visibility conditions, and lost control of the airplane. The transition from visual to instrument flight conditions would have been conducive to the development of spatial disorientation; the turning descent before the loss of radar contact and the in-flight breakup are also consistent with a loss of control due to spatial disorientation.

Probable Cause and Findings

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

The non-instrument-rated pilot's loss of control due to spatial disorientation in instrument meteorological conditions, which resulted in an exceedance of the airplane's design stress limitations and a subsequent in-flight breakup. Contributing to the accident was the pilot's decision to continue visual flight into convective instrument meteorological conditions.

Findings

Personnel issues	Spatial disorientation - Pilot
Personnel issues	Total instrument experience - Pilot
Aircraft	(general) - Not attained/maintained
Aircraft	(general) - Capability exceeded
Personnel issues	Decision making/judgment - Pilot
Environmental issues	Thunderstorm - Decision related to condition

Factual Information

History of Flight

Enroute-cruise	Other weather encounter
Enroute-descent	Inflight upset
Enroute-descent	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On August 7, 2016, about 1219 central daylight time, a Piper PA-46-310P airplane, N465JM, was destroyed when it impacted terrain after an in-flight breakup near Williamson, Iowa. The private pilot sustained fatal injuries. The airplane was owned by Wolf Aviation LLC and operated by the pilot under the provisions of Title 14 *Code of Regulations* Part 91. Instrument meteorological conditions prevailed in the area, and no flight plan was filed for the personal flight, which originated from Johnson County Executive Airport (OJC), Olathe, Kansas, about 1130 and was enroute to Ankeny Regional Airport (IKV), Ankeny, Iowa.

According to radar data and air traffic control communications information from the Federal Aviation Administration (FAA), the pilot was receiving visual flight rules (VFR) flight following from the Chicago Air Route Traffic Control Center (ARTCC) at a cruise altitude of 13,500 ft mean sea level (msl). The pilot had deviated around convective weather earlier in the flight and was proceeding direct to IKV. The controller issued a weather advisory to the pilot about areas of moderate to extreme precipitation along his route, and the pilot responded that he had weather information on the airplane's NEXRAD system. About 3 minutes later, the pilot reported to the controller that he was around the weather and requested to start a descent direct to IKV. The controller responded that the descent altitude was at the pilot's discretion, then instructed the pilot to contact Des Moines Air Traffic Control Tower. The controller received no response from the pilot, and subsequent attempts to contact him were unsuccessful. Radar data showed the airplane making a descending right turn before radar contact was lost (Figure 1). The last radar return showed the airplane about 2,900 ft msl.

An ALNOT was issued, and the airplane was located by local ground and Civil Air Patrol search personnel about 5 hours after the loss of radar contact. There were no eyewitnesses to the accident. Search personnel reported rain and thunderstorms in the area about the time of the accident.

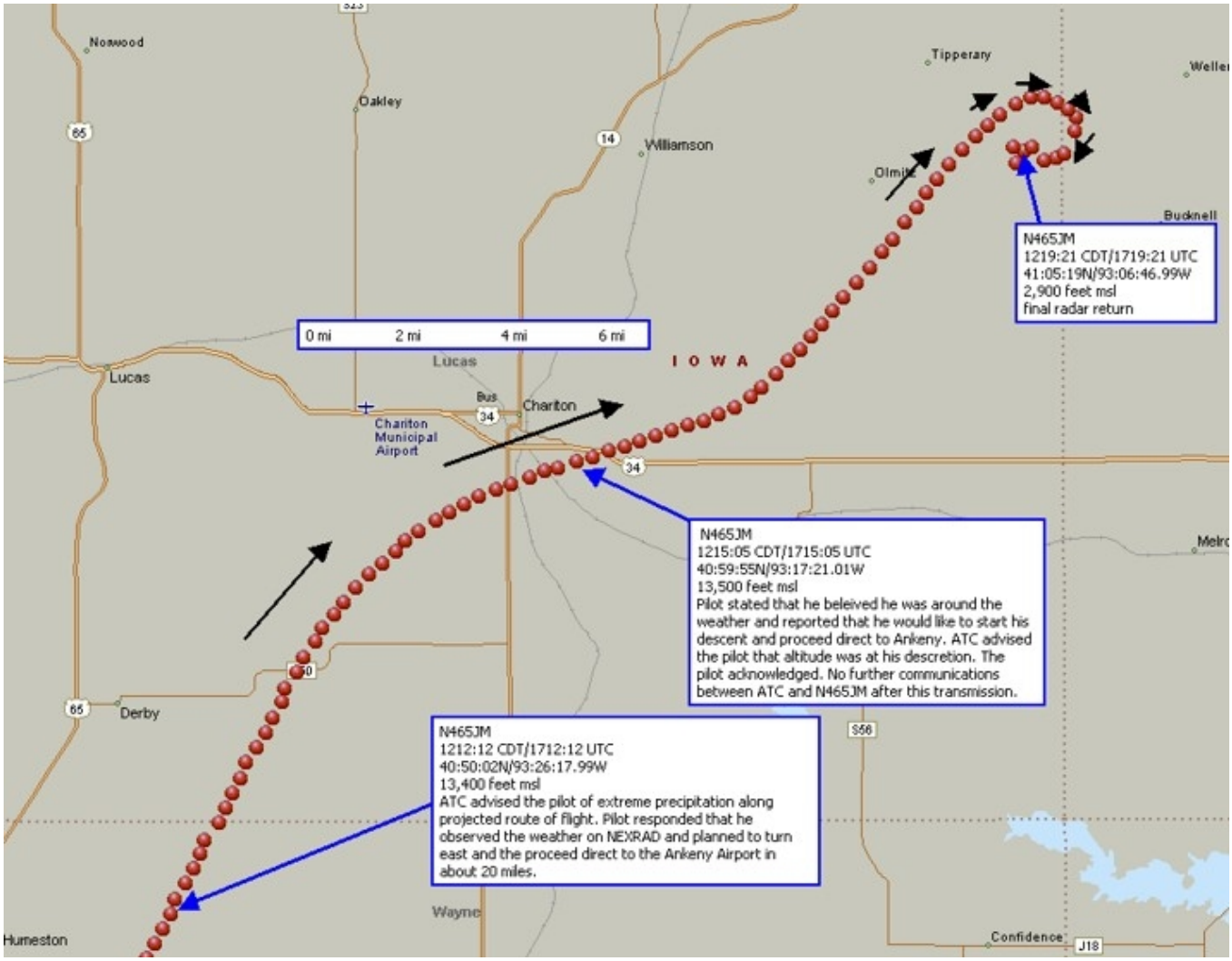

Figure 1. The radar flight track of N465JM is indicated by red dots. The direction of flight is indicated by black arrows.

Pilot Information

Certificate:	Private	**Age:**	42,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
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:**	December 7, 2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 242 hours (Total, all aircraft), 118 hours (Total, this make and model), 1 hours (Last 24 hours, all aircraft)		

According to FAA records, the pilot held a private pilot certificate with a rating for airplane single-engine land. His most recent medical certificate was issued on December 7, 2014. On that date, the pilot was issued a combined student pilot and third class medical certificate.

The pilot's most recent logbooks were not recovered. However, pilot logbook entries were found dating from December 4, 2014, to December 6, 2015. According to the records, the pilot received his private pilot certificate on June 20, 2015, and logged 242.6 hours of total flight time as of December 6, 2015. The records indicated that the pilot began logging flight time in the accident airplane on July 18, 2015. His time in the accident airplane between that date and December 6, 2015, was 111.6 hours. As of December 6, 2015, the pilot had logged 23.8 hours of actual instrument experience and 1.6 hours of simulated instrument experience. Although there were entries in the pilot's logbook showing instrument training, the pilot did not hold an instrument rating.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N465JM
Model/Series:	PA 46-310P	**Aircraft Category:**	Airplane
Year of Manufacture:	1984	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	46-8408042
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	January 15, 2016 Annual	**Certified Max Gross Wt.:**	4100 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	CONTINENTAL
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	TSIO-550
Registered Owner:	On file	**Rated Power:**	310 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The non-pressurized airplane was manufactured in 1984 and was acquired by the pilot in July 2015. Maintenance logbooks were not available. The airplane was equipped with a NEXRAD on-board weather information display system. It is unknown if the pilot was proficient in using the NEXRAD system.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CNC,1050 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	12:15 Local	**Direction from Accident Site:**	230°
Lowest Cloud Condition:	Scattered / 1700 ft AGL	**Visibility**	1 miles
Lowest Ceiling:	Broken / 4500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / 17 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	24°C / 23°C
Precipitation and Obscuration:			
Departure Point:	OLATHE, KS (OJC)	**Type of Flight Plan Filed:**	None
Destination:	ANKENY, IA (IKV)	**Type of Clearance:**	VFR flight following
Departure Time:	11:30 Local	**Type of Airspace:**	

Chariton Municipal Airport (CNC), Chariton, Iowa, was located about 12 miles west-southwest of the accident location at an elevation of 1,050 ft. At 1215, the automated weather observation system at CNC reported wind from 220° at 9 knots with gusts to 17 knots, visibility 1 1/4 miles, light rain, temperature

24°C, dew point temperature 23°C, and an altimeter setting of 29.96 inches of mercury.

Given the pilot's discussions with ATC during the flight, the pilot was aware of and was trying to avoid convective weather along his route of flight. The airplane most likely would have encountered instrument meteorological conditions (IMC) during the last several minutes of flight. Figure 2 shows the airplane's flight path into storms. Additional details can be found in the weather study in the docket.

Figure 2. Level-II reflectivity product from a sweep initiated at 1223:06 CDT. Accident flight path through the accident time denoted by white line with accident location marked.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	Unknown
Ground Injuries:	N/A	**Aircraft Explosion:**	Unknown
Total Injuries:	1 Fatal	**Latitude, Longitude:**	41.090278,-93.108612

The airplane impacted a mature corn field, and components of the wings and empennage were scattered along a path about 1/4-mile long (see figure 3). The main wreckage (cabin and fuselage) came to rest along a stand of trees adjacent to the corn field. The distribution of the wreckage was consistent with an in-flight breakup.

Figure 3. Wreckage Distribution

The fuselage came to rest on a 300° heading. The fuselage was found mostly crushed with numerous skin separations.

The left wing was found separated from the fuselage at the wing root about 225 ft east of the fuselage. No major damage was noted to the leading edge. The fuel cap was in place and fuel was found within the fuel cell. The lift detector on the leading edge of the wing was in place and functional. The pitot tube was found clear of debris and remained secured to its mounts. The left main landing gear was found in the down and locked position. A ground impression about 6 ft long was found near the trailing edge of the wing. The outboard 7 ft of the trailing edge of the wing exhibited upward and forward deformation of the wing skin. About 80 inches of the inboard trailing edge of the wing exhibited upward deformation and skin separations in this area. Minor impact damage was noted to the outboard 6-ft section of the flap. The flap remained attached to its mounts; however, about 5 ft of the inboard section was separated and was not located within the wreckage area. The left aileron was separated from its mounts and was found about 297 ft southwest of the fuselage. The aileron balance weight remained secured to the aileron; however, about 31 inches of the left aileron was separated and was not located within the wreckage area.

A 2-ft section of the right wing was found about 816 ft and 230° to the fuselage. This section of wing contained the fuel pick up screen, which was clear of debris. About 10 ft of the outboard section of the right wing was separated and was not located in the wreckage area. The inboard section of wing remained attached to the fuselage with impact damage and numerous skin separations. The inboard 5 ft of flap remained attached to its mounts; however, the outboard 6 ft of flap was separated and was not located within the wreckage area. The right aileron was not located within the wreckage area. The right aileron control cable ends exhibited broomstrawing consistent with overstress failure. The right main landing gear and trunnion mount were found separated and about 10 ft from the wing. The right main

gear actuator remained attached to its mount and was found in the down and locked position.

The vertical stabilizer was found about 810 ft northeast of the fuselage. It exhibited leading edge damage and the top section was canted to the left. The aft spar of the vertical stabilizer was separated at its attach points. The rudder was found about 649 ft east-northeast of the fuselage and exhibited upward deformation to the bottom and paint transfer marks on the leading edge. The rudder balance weight and surrounding skin was separated from the rudder and was not located within the wreckage area. The rudder torque tube remained attached to the fragmented bellcrank. The remainder of the rudder control bellcrank was found in the tail cone with the rudder cables attached.

The horizontal stabilizers were separated from their mounts and were not located within the wreckage area. The elevator was found about 201 ft southeast of the fuselage. The elevator trim tab remained attached to the elevator. The left trim pushrod remained attached to the elevator trim; however, the right trim pushrod was separated and not located within the wreckage area. The left side of the elevator remained attached to aft spar of the separated horizontal stabilizer. The right side of the elevator forward of its rear spar was separated and was not located within the wreckage area.

No pre-impact anomalies were found with the airframe.

The engine came to rest on its left side with cylinder Nos. 2, 4, and 6 hidden from view beneath the impact-damaged cowling. Cylinder Nos. 1, 3, and 5 pointed upward and were visible in the cowling. Cylinder Nos. 1, 3, and 5 remained intact and were attached to the right side of the crankcase. The lower right crankcase was visible and exhibited impact damage in the area just below the cylinder No. 1 one pushrods. The right exhaust collector was impact-damaged and individual exhaust risers were separated at the cylinder attach points. The engine starter motor remained attached to the starter-adapter, but the air conditioner compressor was separated. The right after-cooler was found separated in the debris near the engine. The top-mounted induction system was found separated and several pieces of broken induction pipes were found in the debris.

A single composite propeller blade was protruding from an impact crater near the front of the engine. The blade did not exhibit chordwise scratching or gouging along its leading edge or blade face. The blade trailing edge exhibited an area of delamination. There were three small trees about 2 to 4 inches in diameter near the front of the main wreckage, which had been cut at an approximate 45° angle. The angle of the cuts was consistent with the propeller rotating at the time of impact.

The engine was transported to a secure facility for further teardown examination. Other than impact damage, no pre-impact anomalies were found during the examination.

Medical and Pathological Information

The Iowa Office of the State Medical Examiner, Ankeny, Iowa, performed an autopsy of the pilot. The cause of death was blunt trauma.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed

toxicology testing of the pilot. No drugs, ethanol, or carbon monoxide were detected.

Tests and Research

An Appareo Stratus GPS device was recovered from the airplane and sent to the NTSB Vehicle Recorder Laboratory. The device did not record any data from the date of the accident.

Additional Information

The FAA Civil Aeromedical Institute's publication, "Introduction to Aviation Physiology," defines spatial disorientation as a loss of proper bearings or a state of mental confusion as to position, location, or movement relative to the position of the earth. Factors contributing to spatial disorientation include changes in acceleration, flight in IMC, frequent transfer between visual meteorological conditions (VMC) and IMC, and unperceived changes in aircraft attitude.

The FAA's Airplane Flying Handbook (FAA-H-8083-3A) describes some hazards associated with flying when the ground or horizon are obscured. The handbook states, in part: "The vestibular sense (motion sensing by the inner ear) in particular tends to confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in the attitude of the airplane, nor can they accurately sense attitude changes that occur at a uniform rate over a period of time. On the other hand, false sensations are often generated; leading the pilot to believe the attitude of the airplane has changed when in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation."

Administrative Information

Investigator In Charge (IIC):	Lemishko, Alexander
Additional Participating Persons:	Craig Decker; FAA FSDO; Des Moines, IA Mike Council; Continental Motors; Mobile, AL Damian Galbraith; Piper; Sarasota, FL
Original Publish Date:	July 16, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93971