



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Auburn Township, Ohio	<b>Accident Number:</b>	ERA19FA181
<b>Date &amp; Time:</b>	May 27, 2019, 23:55 Local	<b>Registration:</b>	N3933T
<b>Aircraft:</b>	Piper PA28R	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

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## Analysis

The pilot departed on a visual flight rules cross-country flight in dark night conditions. Radar data indicated that, about 9 miles from the destination airport, the airplane turned left from its previously established heading and shortly thereafter, it entered a steep, descending right turn that continued until radar contact was lost. The airplane impacted heavily-wooded terrain about 8 miles from the airport. Examination of the wreckage revealed no preimpact mechanical deficiencies that would have precluded normal operation of the airplane or engine.

AIRMETs for instrument flight rules conditions and turbulence were valid at the time of the accident for the area of the accident site. Although the weather observation nearest the accident site around the time of the accident indicated visual flight rules conditions with an overcast cloud ceiling about 5,000 ft above ground level, a witness near the accident site reported an "extremely low cloud deck" at the time of the accident. Further, the weather observations at an airport south of the pilot's destination airport indicated weather conditions were deteriorating. While the pilot did text his girlfriend an image of convective weather activity, there was no record that the pilot obtained a weather briefing for the flight or requested any weather information from flight service or commercial sources. The pilot had received his private pilot certificate about 2 months before the accident and did not have an instrument rating.

Autopsy of the pilot revealed evidence of severe atherosclerotic coronary artery disease and an old myocardial infarction; however, the circumstances of the accident are more consistent with a loss of control due to spatial disorientation than with pilot incapacitation. The pilot's lack of an instrument rating and the dark night conditions both would have been conducive to the development of spatial disorientation, and the airplane's descending turn and high-energy impact are both consistent with the known effects of spatial disorientation.

## Probable Cause and Findings

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

The pilot's loss of control due to spatial disorientation in dark night conditions. Contributing to the accident was his inadequate weather planning, lack of experience flying at night and the deteriorating weather conditions.

## Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Spatial disorientation - Pilot
Personnel issues	Weather planning - Pilot
Personnel issues	Total experience - Pilot
Aircraft	(general) - Not attained/maintained
Personnel issues	Total instrument experience - Pilot
Environmental issues	Dark - Effect on operation
Environmental issues	Low visibility - Effect on operation

## Factual Information

### HISTORY OF FLIGHT

On May 28, 2019, at 2355 eastern daylight time, a Piper PA-28R-180, N3933T, was destroyed when it was involved in an accident near Auburn Township, Ohio. The private pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot departed Cincinnati Lunken Airport (LUK), Cincinnati, Ohio, about 2209, and was destined for Geauga County Airport (7G8), Middlefield, Ohio. The pilot was not communicating with air traffic control and there were no recorded communications with the airplane during the flight. A review of radar data revealed that the airplane was flying directly toward 7G8 on a northeasterly heading. At 2354:41, when the airplane was about 9.6 nautical miles from the airport at an altitude of 2,525 ft mean sea level (msl) and a groundspeed of 136 knots (kts), it made a left turn to the north-northwest and proceeded toward the LaDue Reservoir. As the airplane reached the southeast bank of the reservoir at 2355:21, it was at an altitude of 2,300 ft msl and a groundspeed of 129 kts. The airplane then entered a steep, descending right turn before the data ended at 2355:31. At that time, the airplane's heading was 104° at an altitude of 1,300 ft msl and a groundspeed of 169 kts.

According to the pilot's girlfriend, she and her daughter had been camping with the pilot in Kentucky during the days before the accident. The girlfriend said that she drove home (near 7G8) and the pilot flew her daughter to LUK so that she could then take a commercial flight from the major airport in Cincinnati. The girlfriend stated that the pilot landed at LUK about 1800, and his departure to 7G8 was delayed due to weather. The pilot texted her at 2209 and said that he was on his way with an estimated time of arrival of 2330. About 16 minutes after the pilot departed, he sent her a picture of the instrument panel, which was illuminated. The airplane was level at 5,400 ft msl, on a heading of 055°, and all the electronic engine gauges (oil temperature, oil pressure, and fuel pressure) were within the normal range. The manifold pressure was 23 inches and the tachometer indicated 2,330 rpm. The electronic fuel gauges indicated that the right tank was slightly below full and the left tank was full. At 2226, the pilot sent his girlfriend a text asking about the weather. She stated, "Lots of storms that way... Still raining hard and thundering here." She sent additional texts about the weather and asked him how the flight was going, but the pilot did not respond.

A witness stated that he was out walking his dogs around midnight when he heard an aircraft flying from south to north toward the reservoir. Initially, he was not sure if it was an airplane or a helicopter because the engine did not sound typical for either aircraft. The witness then concluded it was an airplane that sounded as if the engine was "sputtering" and that it "definitely had an erratic engine sound." The witness said he raised his "spotlight" to the sky and noted an "extremely low cloud deck." He then entered his home and heard "a very loud thud/boom." The witness said his wife also heard the "boom" but they both thought it was thunder since storms had just passed through the area. It was not until the next day that the witness realized the airplane had crashed.

### PERSONAL INFORMATION

The pilot was issued his private pilot certificate on March 24, 2019. He had accrued 3.7 hours of simulated instrument time and 11.8 hours at night. The pilot did not have an instrument rating.

#### METEOROLOGICAL INFORMATION

The closest weather reporting facility to the accident site was located at Portage County Airport (POV), Ravenna, Ohio, about 12 miles south of the accident site.

The 2355 observation included was calm wind calm, visibility 7 miles visibility, scattered clouds at 5,000 ft above ground level (agl), temperature 18° C, dew point 17° C, and an altimeter setting of 29.76 inches of Hg.

The 0015 observation included calm wind, 1 1/4 miles visibility, scattered clouds at 200 ft and 4,800 ft agl, temperature 18°C, dew point 17°C, and an altimeter setting of 29.76 inches of Hg.

The National Weather Service had issued AIRMET Sierra for instrument flight rules (IFR) conditions and AIRMET Tango for moderate turbulence from the surface to 15,000 ft, both of which were valid at the time of the accident over the area of the accident site.

A search of the FAA's contract Automated Flight Service Station (AFSS) provider, Leidos, revealed that the pilot filed a visual flight rules flight plan for the flight using the Garmin pilot application; however, the pilot did not request any weather or route briefings. A search of ForeFlight indicated that the pilot did not contact Foreflight on the day of the accident. Though the pilot sent a screenshot of weather radar in a text to his girlfriend, beyond this it is unknown what weather information the pilot may have accessed before departing on the flight.

At the time of the accident, both the sun and the moon were more than 15° below the horizon and provided no illumination.

#### WRECKAGE AND IMPACT INFORMATION

The airplane came to rest in heavily wooded terrain on the southeast bank of the reservoir about 8 miles southwest of 7G8. The initial impact point was a 70- to 80-ft-tall tree. Impact marks on the trees became progressively lower on a heading of 133°; the airplane impacted the ground in a nose-low attitude. The distance between the initial impact to the point where the engine came to rest was about 270 ft. The airplane was heavily fragmented, and the outboard sections of both wings, the tail section, instrument panel, engine, and the propeller were found along the wreckage path. The largest portion of debris was a section of fuselage that contained the front and rear seats. There was no postimpact fire.

Examination of the airplane revealed that the flaps and landing gear were fully retracted. The stabilator trim actuator was found in the full nose-down position. Flight control cables for all major flight controls were accounted for and found broken in numerous areas. The broken ends of these cables exhibited broom-straw fractures consistent with overstress.

Both wing fuel tanks were breached and the finger screens were absent of debris. The fuel selector had separated from the airframe but was found selected to the right tank. The gascolator had also separated from the airframe and only the bowl section, which was crushed, was located. The electric fuel pump separated from the airframe and was functional when electrical current was applied. The engine-driven

fuel pump was impact damaged and could not be tested. The fuel servo had partially separated from the engine and sustained impact damage. The finger screen was found in the wreckage and was absent of debris. The servo was disassembled, and the diaphragms were intact. The fuel manifold sustained impact damage but remained secure to the engine. The manifold was disassembled and no fuel was found in the housing. The diaphragm was not damaged.

The oil sump was impact separated from the engine. The oil filter was disassembled and the filament was absent of debris.

The engine sustained impact damage. The No. 2 cylinder was partially separated from the engine case and the No. 4 cylinder was slightly displaced from the engine case and missing the rocker cover. The top and bottom spark plugs sustained impact damage and were removed. The electrodes appeared light gray in color consistent with normal wear per the Champion Check-A-Plug chart. A borescope was used to internally examine the engine. A large amount of mud and dirt was observed, but no internal damage to the pistons and valves was noted. The engine was manually rotated via the vacuum pump drive-spline, which was inhibited by the debris, but valve train movement was observed on all cylinders except the No. 2 cylinder due to it being separated. Strong compression was established on the Nos. 1 and 3 cylinders, and weak compression on the No. 4 cylinder due to impact damage. Both magnetos were separated from the engine; one magneto was rotated with a drill and spark was produced to each terminal. Impact damage to the other magneto precluded functional testing. The vacuum pump was disassembled and the drum was fractured, but the vanes were intact.

The two-bladed propeller separated from the engine at the crankshaft, but both blades remained attached to the hub. One blade was bent forward about 70° at mid-span and exhibited leading edge gouging. The other blade was bent forward at the hub and the tip of the blade was curled. The leading edge of the blade exhibited some gouging. Several slash marks consistent with propeller rotation were observed on a cluster of trees near where the airplane first impacted the ground. One of the slash marks extended about halfway through the approximately 12-inch-wide tree. The propeller governor separated from the engine and was impact damaged.

No mechanical issues were noted with the airplane or engine that would have precluded normal operation.

#### MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was conducted by the Cuyahoga County Medical Examiner's Office. The cause of death was multiple blunt force trauma. According to the autopsy report, the pilot had 95% and 90% atherosclerotic narrowing of the left anterior descending and left circumflex coronary arteries, respectively. The right coronary artery could not be evaluated. The medical examiner reported a 4 x 2 x 1.5-centimeter area of white fibrosis on the posterior left ventricle of the heart that was consistent with a scar from a previous heart attack. No other significant natural disease was identified.

Toxicology testing performed at the Federal Aviation Administration (FAA) Forensic Sciences Laboratory was negative for all tested-for drugs.

#### ADDITIONAL INFORMATION

The FAA Civil Aeromedical Institute's publication, "Introduction to Aviation Physiology," defines spatial disorientation as a "loss of proper bearings; 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 IFR conditions, frequent transfer between visual flight rules and IFR conditions, and unperceived changes in aircraft attitude.

The FAA's *Airplane Flying Handbook* (FAA-H-8083-3B) describes some hazards associated with flying when the ground or horizon are obscured. The handbook states, in part, the following:

*The vestibular sense (motion sensing by the inner ear) in particular can and will confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in airplane attitude, 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.*

## History of Flight

<b>Enroute</b>	VFR encounter with IMC
<b>Enroute</b>	Loss of control in flight (Defining event)
<b>Uncontrolled descent</b>	Collision with terr/obj (non-CFIT)

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	55, 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 With waivers/limitations	<b>Last FAA Medical Exam:</b>	June 19, 2018
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	March 24, 2019
<b>Flight Time:</b>	142.8 hours (Total, all aircraft), 132.8 hours (Total, this make and model), 104.9 hours (Pilot In Command, all aircraft), 73.1 hours (Last 90 days, all aircraft), 31.5 hours (Last 30 days, all aircraft), 0.6 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Piper	<b>Registration:</b>	N3933T
<b>Model/Series:</b>	PA28R 180	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1967	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	28R-30273
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	January 21, 2019 Annual	<b>Certified Max Gross Wt.:</b>	2500 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	3041.1 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	C91 installed, not activated	<b>Engine Model/Series:</b>	IO-360-B1A
<b>Registered Owner:</b>		<b>Rated Power:</b>	180 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Night
<b>Observation Facility, Elevation:</b>	POV, 1196 ft msl	<b>Distance from Accident Site:</b>	12 Nautical Miles
<b>Observation Time:</b>	23:55 Local	<b>Direction from Accident Site:</b>	180°
<b>Lowest Cloud Condition:</b>	Scattered / 5000 ft AGL	<b>Visibility</b>	7 miles
<b>Lowest Ceiling:</b>		<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	/	<b>Turbulence Type Forecast/Actual:</b>	None / None
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	N/A / N/A
<b>Altimeter Setting:</b>	29.7 inches Hg	<b>Temperature/Dew Point:</b>	18° C / 17° C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Lunken, OH (LUK )	<b>Type of Flight Plan Filed:</b>	VFR
<b>Destination:</b>	Middlefield, OH (7GB )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	22:09 Local	<b>Type of Airspace:</b>	Unknown

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	41.375278,-81.193054

## Preventing Similar Accidents

### Reduced Visual References Require Vigilance

About two-thirds of general aviation accidents that occur in reduced visibility weather conditions are fatal. The accidents can involve pilot spatial disorientation or controlled flight into terrain. Even in visual weather conditions, flights at night over areas with limited ground lighting (which provides few visual ground references) can be challenging.

Preflight weather briefings are critical to safe flight. In-flight, weather information can also help pilots make decisions, as can in-cockpit weather equipment that can supplement official information. In-cockpit equipment requires an understanding of the features and limitations.

We often see pilots who decide to turn back after they have already encountered weather; that is too late. Pilot's shouldn't allow a situation to become dangerous before deciding to act. Additionally, air traffic controllers are there to help; be honest with them about your situation and ask for help.

Even when flying at night, visual weather conditions can also be challenging. Remote areas with limited ground lighting provide limited visual reference cues for pilots, which can be disorienting or render rising terrain visually imperceptible. Topographic references can help pilots become more familiar with the terrain. The use of instruments, if pilots are proficient, can also help pilots navigate these challenging areas.

See [http://www.nts.gov/safety/safety-alerts/documents/SA\\_020.pdf](http://www.nts.gov/safety/safety-alerts/documents/SA_020.pdf) for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Read, Leah		
<b>Additional Participating Persons:</b>	Alexander McAninch; FAA/FSDO; Cleveland, OH David Harsanyi; Lycoming; Williamsport, PA Kathryn Whitaker; The New Piper Aircraft Company; Phoenix, AZ		
<b>Original Publish Date:</b>	December 3, 2020	<b>Investigation Class:</b>	3
<b>Note:</b>	The NTSB traveled to the scene of this accident.		
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=99500">https://data.nts.gov/Docket?ProjectID=99500</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](#).