Aviation Investigation Final Report

Location:	Hardy, Arkansas	**Accident Number:**	CEN22FA082
Date & Time:	December 26, 2021, 17:29 Local	**Registration:**	N5798T
Aircraft:	Cessna 172	**Aircraft Damage:**	Destroyed
Defining Event:	VFR encounter with IMC	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The non-instrument-rated private pilot was conducting a visual flight rules cross-country flight over mountainous terrain with a passenger in an airplane that was not equipped for instrument flight. There is no evidence that the pilot received a preflight weather briefing before the flight and the amount of fuel onboard the airplane at takeoff is unknown.

While en route, the pilot contacted air traffic control and requested the weather at his destination airport along with the weather at additional airports. When queried, he stated he was over his destination airport. Instrument meteorological conditions prevailed at the destination airport at the time. The pilot reported that he wanted to land because he had less than a quarter tank of fuel left, and he was going to continue flying west. Weather conditions further to the west were showing visual meteorological conditions at the time. The pilot informed air traffic control that he was setting up to land at an alternate airport when radar contact was lost.

Radar data showed the airplane was at an altitude of about 4,000 ft, about 2.5 nautical miles (nm) from the airport, when it turned right, descended slowly, and flew a track consistent with an attempt to make an approach. The airplane then entered a tight left turn and traveled to the north. During this time there were abrupt changes in ground speed, altitude, and the direction of flight. The airplane executed at least one sharp counterclockwise 360° turn before the data was lost.

A review of meteorological data showed that low cloud ceilings, low visibility, and low-level windshear prevailed at the accident site. Based on the weather conditions and the flight track data, it is likely that the pilot encountered low cloud ceilings and low visibility conditions. The flight track data was consistent with the known effects of spatial disorientation. It is likely

there were no outside visual references, the pilot had an increase in workload due to spatial disorientation, and he was unable to recover the airplane from its descent. The airplane impacted trees and terrain with a near-vertical descent angle. The airplane was destroyed.

One text messages that the passenger sent to a family member while in flight stated, “ran into weather can’t see anything” and another text message later stated, “out of gas in air.”

Examination of the airframe and the engine did not reveal any preimpact mechanical malfunctions or failures that would have precluded normal operation. There was no evidence of fuel at the accident site. The pilot had first reported to air traffic control that he had a low fuel status and then later reported that he had no fuel. The fuel exhaustion likely resulted in a loss of engine power; however, the pilot did not report this to air traffic control.

It is likely that the pilot decided to continue visual flight into an area of instrument meteorological conditions due to his low fuel status. The low fuel status eventually resulted in fuel exhaustion and a subsequent loss of engine power. The pilot’s continued flight into instrument meteorological conditions resulted in spatial disorientation and a loss of airplane control.

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 decision to continue visual flight into an area of instrument meteorological conditions, which resulted in a loss of control due to spatial disorientation. Contributing to the accident was a loss of engine power due to fuel exhaustion.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Spatial disorientation - Pilot
Environmental issues	Below VFR minima - Effect on operation
Aircraft	Fuel - Fluid level
Personnel issues	Fuel planning - Pilot

Factual Information

History of Flight

Enroute	Fuel exhaustion
Enroute	VFR encounter with IMC (Defining event)
Enroute	Loss of visual reference
Enroute	Loss of control in flight
Enroute	Collision with terr/obj (non-CFIT)

On December 26, 2021, about 1729 central standard time, a Cessna 172E airplane, N5798T, was destroyed when it was involved in an accident near Hardy, Arkansas. The private pilot and passenger sustained fatal injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

A review of flight track data indicated that the airplane was airborne before it was visible on radar. The airplane first appeared about 13 nm north of the Walnut Ridge Regional Airport (ARG), Walnut Ridge, Arkansas, at 1627, at an altitude of about 2,500 ft. The airplane flew generally south toward ARG until track data was lost at about 1643, 3.5 nm north of ARG.

The airplane's track data reappeared at 1653, about 3 nm north of ARG, climbing from 2,800 ft. The airplane flew left and right several times in a back and forth "s-type" movement and then straightened out, flew west-north-west, and climbed to an altitude of about 4,500 ft, then descended lower in the latter part of the flight.

While en route, the pilot contacted air traffic control and requested the weather at his destination airport along with the weather at additional airports. When queried, he stated he was over his destination airport. The pilot reported that he wanted to land because he had less than a quarter tank of fuel left, and he was going to continue flying west. The pilot then informed air traffic control that he was setting up to land at an alternate airport when radar contact was lost.

At 1722, the airplane crossed over the Sharp County Regional Airport (CVK), Ash Flat, Arkansas, from east to west at an altitude of about 4,000 ft. When the airplane was almost 2.5 nm west-north-west of CVK, it turned right, descended slowly, and flew a track consistent with an attempt to make an approach to CVK. The airplane then entered a tight left turn and traveled to the north. During this time there were abrupt changes in ground speed, altitude, and the direction of flight. The airplane entered at least one sharp counterclockwise 360° turn and flew north-north-east until track data was lost about 1728.

The Fulton County (Arkansas) Sheriff's Office was provided copies of text messages the passenger sent to a family member while in flight. One text message stated, "ran into weather can't see anything" and another text message later stated, "out of gas in air."

The airplane, which was located on heavily wooded private property in the Ozark mountains, was destroyed by the impact sequence.

Pilot Information

Certificate:	Private	**Age:**	57,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	BasicMed Without waivers/limitations	**Last FAA Medical Exam:**	November 24, 2021
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 379.3 hours (Total, all aircraft), 290.4 hours (Pilot In Command, all aircraft)		

According to Federal Aviation Administration (FAA) records, the pilot did not hold an instrument rating.

The pilot's logbook had an entry for a flight review; however, the date block was found empty. The entry was signed by the flight instructor on November 14, 2019.

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N5798T
Model/Series:	172 E	**Aircraft Category:**	Airplane
Year of Manufacture:	1964	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	17251698
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	2300 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Continental Motors
ELT:	C91A installed	**Engine Model/Series:**	O-300-D4D
Registered Owner:	On file	**Rated Power:**	145 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None
Operator Does Business As:	On file	**Operator Designator Code:**	None

The airplane was not equipped for instrument flight.

The airplane was modified via an FAA-approved supplemental type certificate to utilize automotive gasoline. Investigators were not able to determine how much fuel was on board at the time of departure.

The airplane’s maintenance records were not available for review.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KARG,273 ft msl	**Distance from Accident Site:**	33 Nautical Miles
Observation Time:	16:56 Local	**Direction from Accident Site:**	114°
Lowest Cloud Condition:		**Visibility**	0.5 miles
Lowest Ceiling:	Overcast / 200 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.87 inches Hg	**Temperature/Dew Point:**	14°C / 0°C
Precipitation and Obscuration:	Moderate - None - Fog		
Departure Point:	Geneseo, IL (3GB)	**Type of Flight Plan Filed:**	None
Destination:	Walnut Ridge, AR (ARG)	**Type of Clearance:**	VFR
Departure Time:	10:30 Local	**Type of Airspace:**	Class G

A search of archived ForeFlight information indicated that the pilot did have a ForeFlight account and could have looked at “live” weather data, but that data is not logged.The pilot did not request a weather briefing or review static weather imagery before the accident flight.

A review of meteorological data showed that a warm frontal boundary was located over the area of the accident site, with small temperature-dew point spreads, allowing for abundant moisture for cloud, fog, and drizzle formation. An inversion with the inversion top near 5,000 ft mean sea level (msl) was over ARG and over the area of the accident site. In addition to the low instrument flight rules (LIFR) conditions, there were relatively strong wind conditions from the surface to 8,000 ft msl that would have led to low-level wind shear.

As noted by pilot reports and the 1700 High-Resolution Rapid Refresh sounding, the cloud tops of the first layer of clouds were likely between 2,700 and 3,500 ft msl, with additional high clouds above that noted on the GOES-16 infrared imagery.

An AIRman’s METeorological Information (AIRMET) Sierra for instrument flight rules (IFR) conditions was valid for the accident site at the accident time along with Center Weather Advisory 106, which forecast LIFR conditions. The freezing level was above 12,000 ft, which was above the accident flight’s flight level. The AIRMET for IFR conditions were noted on the Graphical Forecasts for Aviation, and were valid before the accident flight departed.

A witness, located about 1 mile north of the accident site, reported that he observed “heavy fog” in the area at the time of the accident and he estimated the visibility to be about 500 ft.

Astronomical conditions indicated the accident occurred right after the conclusion of civil twilight, which occurred at 1726. Sunset occurred at 1657.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	36.346112,-91.542252

The airplane came to rest in a heavily wooded area on private property. The area was composed of various deciduous trees about 50 ft tall and a collapsed and abandoned house (the house was collapsed before the accident).

The airplane came to rest, nose down, and created a 6 ft deep by 6 ft wide impact crater. The engine and the propeller were buried in the dirt. There was no postimpact fire or evidence of an explosion. No smell of fuel was present, and no signs of fuel were observed in the wreckage. All major structural components of the airplane were accounted for, and the wreckage was confined to the immediate area around the impact crater. The airplane was destroyed.

Several of the 50 ft trees had broken limbs; however, no trees appeared to have fallen due to an impact with the airplane. The damage to the various trees was consistent with a near-vertical descent through the trees that terminated in the ground.

The accident site was at an elevation of 730 ft above msl.

Flight control continuity was established from the control surfaces to inboard toward the cabin. Flight control continuity within the cabin could not be established due to the damage sustained.

The left and right fuel tanks were both breached from the accident sequence. The right and left fuel tank caps were found open from the filler opening but remained connected with the chain lanyard. No signs of fuel were found in the fuel tanks. The insides of both tanks were examined, and no issues were noted. No major debris was found within the fuel system that would have inhibited fuel delivery from either tank.

Airframe to engine control continuity could not be determined due to the impact damage. The cockpit area was destroyed along with the various instrumentation.

The engine and engine accessories sustained impact damage. The propeller sustained impact damage that separated the hub and both propeller blades were found separated. The hub sustained several impact fractures. Chordwise scratching was observed on both blades.

Examination of the airframe and the engine did not reveal any preimpact mechanical malfunctions or failures that would have precluded normal operation.

Medical and Pathological Information

An autopsy of the pilot was performed by the Arkansas State Crime Laboratory in Little Rock, Arkansas. The autopsy report was reviewed by the NTSB Investigator-In-Charge. The cause of death was multiple blunt force injuries

Additional Information

Spatial Disorientation

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." This document lists flight factors contributing to spatial disorientation: changes in angular acceleration, flight in IFR conditions, low-level flight over water, frequent transfer from VFR to IFR conditions, and unperceived changes in aircraft attitude. This document concludes with, "anytime there is low or no visual cue coming from outside of the aircraft, you are a candidate for spatial disorientation."

The FAA's Airplane Flying Handbook, FAA-H-8083-3C, 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 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.

Administrative Information

Investigator In Charge (IIC):	Hodges, Michael
Additional Participating Persons:	Paul Centinaro; FAA Little Rock FSDO; Little Rock, AR Jennifer Barclay; Textron Aviation; Wichita, KS
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