Aviation Investigation Final Report

Location:	Berwyn, Nebraska	**Accident Number:**	CEN21FA150
Date & Time:	March 6, 2021, 06:10 Local	**Registration:**	N166WW
Aircraft:	Aviat A-1B	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of visual reference	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Primary radar first picked up the airplane about 0555, 1/2 mile south of the private runway. The airplane track proceeded generally west-southwest for about 11 miles when it made a left turn toward the south at a speed of about 88 knots. The track then made right 360-degree turn; during which, the speed of the airplane increased to about 114 knots. Followed by a tighter 360-degree turn at 49 knots and decreasing. The track then zig zagged at an average of 30 knots until 0609 when the track terminated about 1,000 ft from the accident site.

The airplane impacted a field perpendicular to a gully in a very rural area; the debris field was about 300 ft long. The first identified point of impact was a long narrow area of disturbed dirt with the right wingtip nearby. Next were two slash marks consistent with propeller blade slices; followed by a large area of disturbed dirt with propeller blade fragments. The main wreckage came to rest at the bottom of the gully; the last major piece of debris was the engine. Postaccident examination of the airframe and engine did not reveal any anomalies that would have precluded normal operations.

The pilot flew the accident airplane regularly over his land and pastures. It was not abnormal for him to takeoff before sunrise despite not holding an instrument rating. At the time of the accident the moon was 22.97 degrees above the horizon at third quarter phase. Its illumination was 45.1% of the moon's full potential. There were no high-altitude cloud layers to block the moonlight. Therefore, it was dark with the exception of any ground lights and moon illumination.

The flight track immediately before the accident was consistent with a pilot experiencing spatial disorientation and subsequently losing airplane control. Several factors support this conclusion, which include the low moonlight; few ground lights in a rural area; the pilot's lack of instrument rating; and the airplane's abrupt roll, heading, and speed changes leading up to the accident site.

Probable Cause and Findings

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

A loss of control and subsequent impact with terrain as a result of spatial disorientation during cruise in dark night conditions.

Findings

Personnel issues	Spatial disorientation - Pilot
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Aircraft control - Pilot
Personnel issues	Qualification/certification - Pilot
Environmental issues	Dark - Effect on personnel

Factual Information

History of Flight

Enroute-cruise	Loss of visual reference (Defining event)
Enroute-cruise	Loss of control in flight
Enroute-cruise	Collision with terr/obj (non-CFIT)

On March 6, 2021, about 0610 central standard time, an Aviat A-1B airplane, N166WW, was destroyed when it was involved in an accident near Berwyn, Nebraska. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 personal flight.

The purpose of the flight was to fly from the pilot's private runway to Holyoke, Colorado for an annual inspection. About 0555, primary radar first picked up the airplane about 1/2 mile south of the private runway. The airplane track proceeded generally west-southwest for about 11 miles when it made a left turn toward the south at a speed of about 88 knots. The track then made right 360-degree turn; during which, the speed of the airplane increased to about 114 knots. Followed by a tighter 360-degree turn at 49 knots and decreasing. The track then zig zagged at an average of 30 knots until 0609 when the track terminated about 1,000 ft from the accident site.

A GPS was recovered from the accident site; however, the unit and memory card exhibited extensive impact damage and data was unable to be extracted.

Pilot Information

Certificate:	Private	**Age:**	74,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	BasicMed With waivers/limitations	**Last FAA Medical Exam:**	June 26, 2020
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 2395 hours (Total, all aircraft), 2395 hours (Total, this make and model)		

The pilot was issued a private pilot certificate on May 26, 1969. The pilot flew the accident airplane regularly over his land and pastures; and was used to maneuvering at low altitudes. It was not abnormal for him to takeoff before sunrise, especially if he needed to get somewhere and return in the same day.

Aircraft and Owner/Operator Information

Aircraft Make:	Aviat	**Registration:**	N166WW
Model/Series:	A-1B	**Aircraft Category:**	Airplane
Year of Manufacture:	2006	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2372
Landing Gear Type:	Tailwheel	**Seats:**	
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	IO-360-A1D6
Registered Owner:	On file	**Rated Power:**	200 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	BBW,2546 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	05:53 Local	**Direction from Accident Site:**	325°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.15 inches Hg	**Temperature/Dew Point:**	-1°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Mason City, NE (PVT)	**Type of Flight Plan Filed:**	None
Destination:	Holyoke, CO (HEQ)	**Type of Clearance:**	Unknown
Departure Time:	05:55 Local	**Type of Airspace:**	

At the time of the accident the moon was 22.97 degrees above the horizon in third quarter phase. Its illumination was 45.1% of the moon's full potential. There were no high-altitude cloud layers. Dawn started at 0636 and sunrise was at 0704.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	41.1965,-99.4836

The airplane impacted a field perpendicular to a gully in a very rural area; the debris field was about 300 ft long. The first identified point of impact was a long narrow area of disturbed dirt with the right wingtip nearby. Next were two slash marks consistent with propeller blade slices; followed by a large area of disturbed dirt with propeller blade fragments. The main wreckage came to rest at the bottom of the gully; the last major piece of debris was the engine.

The airframe came to rest in a ball and exhibited extensive thermal damage. The fabric was completely gone and only the frame remained. Flight control continuity was mostly established throughout the airframe. The rudder controls were untraceable within the cockpit area; they were in an area of melted material. Both composite propeller blades were fracture separated at the blade root, and one blade was also fractured midspan. Both blades exhibited chordwise scratching on the face and chamber sides.

The engine was found fracture separated from the airframe; it exhibited extensive thermal damage and there were no visual signs of catastrophic anomalies. The firewall was removed, and the engine was attached to an engine hoist for further examination. The spark plugs were removed and consistent with normal operations. The fuel flow divider was disassembled, and fuel residue was present. The fuel servo remained attached, but the engine controls were fracture separated consistent with impact damage. The valve covers were removed, and the valves were unremarkable. The crankshaft was rotated by the propeller hub and continuity was established to the accessory section. Thumb compression was established on all cylinders and the valves moved accordingly. The engine was borescoped; the cylinder walls, piston heads, and valves displayed normal operating signatures. Spark was obtained on the right magneto; the left magneto was unable to be rotated and exhibited heavy thermal damage. The ignition harness was unable to be functionally tested due to damage consistent with impact.

Medical and Pathological Information

The Federal Aviation Administration (FAA) Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed forensic toxicology on specimens from the pilot with positive results for Diltiazem and Warfarin in the liver and muscle. ‘

Diltiazem is a prescription blood pressure medication that may also be used to treat fast heart rates associated with atrial fibrillation, an abnormal heart rhythm. Warfarin is a blood thinner used to prevent blood clots in patients with previous ischemic stroke, atrial fibrillation, or other forms of blood clots. Neither are generally considered impairing.

Administrative Information

Investigator In Charge (IIC):	Link, Samantha
Additional Participating Persons:	Tim Cray; Federal Aviation Administration; Lincoln, NE Troy Helgeson; Lycoming; Williamsport, PA
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Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=102722