



Aviation Investigation Final Report

Location:	Moab, Utah	Accident Number:	WPR24FA002
Date & Time:	October 1, 2023, 20:24 Local	Registration:	N7153R
Aircraft:	Piper PA-28-140	Aircraft Damage:	Substantial
Defining Event:	Controlled flight into terr/obj (CFIT)	Injuries:	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and three family members departed to return to their home airport. The departure was during dark nighttime conditions and into an area with little ambient light for visual reference. A witness statement, confirmed by video evidence, indicated that the pilot did not use the pilot-controlled runway lights and turned off the airplane landing light immediately after takeoff.

Review of ADS-B data showed that, while at a low altitude, the airplane began a continuous 180° right turn that was described by the witness as steep and descending.

Impact marks indicated that the pilot likely began a climb or held a nose-up attitude before the airplane's landing gear struck a hill. The airplane continued beyond this first hill for about 540 ft, where it then descended in a nose-low attitude and impacted a second hill. The impacts fatally injured the occupants and substantially damaged the airplane.

Before the accident flight, the pilot received a weather briefing that reported visual meteorological conditions for the departure airport, route of flight, and destination airport. The briefing did not include information on moon rise or illumination. A weather study revealed that, at the time of takeoff, the full moon had not risen completely above the horizon.

The pilot did not use the functional pilot-controlled runway lights, thus eliminating this light source as a possible visual aid during the departure. Additionally, a local operator stated that their company pilots do not usually depart on the runway used by the accident pilot at night due to the dark conditions and the lack of visual references.

The Federal Aviation Administration (FAA) Airplane Flying Handbook advised pilots flying at night that, after becoming airborne, the darkness of night often makes it difficult to note

whether the airplane is getting closer to or farther from the surface. The handbook also stated to check flight instruments frequently during takeoff to ensure proper airspeed, attitude, and heading, and to climb to a safe maneuvering altitude before turning. The handbook noted that, when using the landing light at night during takeoff, a pilot should turn it off after the climb is well established.

It is likely that the pilot neither had adequate visual references after takeoff nor monitored the airplane's flight instruments appropriately to detect the airplane's descent during the continuous 180° crosswind to downwind turn. This likely led to the pilot experiencing spatial disorientation, resulting in controlled flight into terrain.

Postaccident examination of the airframe and engine revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation. A review of the maintenance logbooks revealed no anomalies.

Probable Cause and Findings

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

The pilot's loss of visual reference to the horizon while departing during dark night, which resulted in the pilot experiencing spatial disorientation and subsequent controlled flight into terrain.

Findings

Personnel issues	Visual illusion/disorientation - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	Altitude - Not attained/maintained
Environmental issues	Dark - Effect on personnel

Factual Information

History of Flight

Initial climb	Controlled flight into terr/obj (CFIT) (Defining event)
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On October 1, 2023, about 2024 mountain daylight time, A Piper PA-28-140, N7153R, was substantially damaged when it was involved in an accident near Moab, Utah. The pilot and three passengers were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

An airport security video recorded the airplane landing at 1747 at the Canyonlands Regional Airport (CNY), Moab, Utah. According to a fixed-base-operator employee, the pilot purchased 27 gallons of fuel, parked the airplane near the fuel island, and departed the airport with his family. The occupants returned later in the evening and boarded the airplane. At 2022:47, ADS-B data showed the airplane on runway 21. The security video showed that the pilot-controlled runway lights were not illuminated at that time. At 2023:39, ADS-B data showed the airplane was about mid-runway when it departed the runway surface. At 2024:18, ADS-B data showed the airplane had drifted left of the runway centerline and had begun a right turn, about 400 ft beyond the departure end of the runway at an altitude of about 4,500 ft mean sea level (msl).

A witness, located near the departure end of runway 21, reported that he saw the airplane take off to the southwest. He stated that the runway lights were not on and that the engine was loud and smooth. The witness further saw “the light in the nose turn off,” and stated that the airplane wasn’t very high when it turned steeply to the right and stayed in the steep bank until it was parallel with the runway but in the opposite direction. The witness said that, based upon a reference light from a tower, the red light of the airplane appeared to be losing altitude before he lost sight of it and heard two sounds that were about one second apart. After the second sound, there was no longer an engine sound. The last ADS-B data point recorded around 2024 captured the airplane about 715 ft southwest of the accident site at an altitude of about 4300 ft msl, or zero ft above ground level. According to the owner of the ADS-B data provider, the reported altitude had an uncertainty of ± 200 ft.

Pilot Information

Certificate:	Commercial; Private	Age:	47, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Unknown
Instrument Rating(s):	Airplane; Helicopter	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	February 23, 2023
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	2079.6 hours (Total, all aircraft), 239.1 hours (Total, this make and model), 257.5 hours (Pilot In Command, all aircraft)		

Passenger Information

Certificate:		Age:	Female
Airplane Rating(s):		Seat Occupied:	Unknown
Other Aircraft Rating(s):		Restraint Used:	Unknown
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Passenger Information

Certificate:		Age:	11, Male
Airplane Rating(s):		Seat Occupied:	Unknown
Other Aircraft Rating(s):		Restraint Used:	Unknown
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Passenger Information

Certificate:		Age:	Male
Airplane Rating(s):		Seat Occupied:	Unknown
Other Aircraft Rating(s):		Restraint Used:	Unknown
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

A review of the pilot's logbook revealed that he recorded a total of 44.8 hours of night flying experience. The last recorded night flights were September 27-28, 2023, for a total of 3.6 hours.

The pilot was a member of the South Dakota Army Reserve National Guard (SDARNG). A review of his individual flight records revealed that he had a total of 1,777.8 hours flight experience in military helicopters, but no record of fixed-wing flight experience with the SDARNG.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N7153R
Model/Series:	PA-28-140	Aircraft Category:	Airplane
Year of Manufacture:	1966	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	28-21860
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	March 20, 2023 Annual	Certified Max Gross Wt.:	2150 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	4642.78 Hrs as of last inspection	Engine Manufacturer:	Lycoming
ELT:	C91 installed, not activated	Engine Model/Series:	O-320-E2A
Registered Owner:	On file	Rated Power:	140 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

A review of maintenance records revealed that the engine was overhauled on October 19, 2019. The last annual inspection of the airframe, engine, and propeller occurred on March 20, 2023, at a tachometer time of 1842.78 hours and a total time of 4642.78 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Night/dark
Observation Facility, Elevation:	KCNY,4551 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	20:53 Local	Direction from Accident Site:	107°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Broken / 11000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	260°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	29.93 inches Hg	Temperature/Dew Point:	13°C / 3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Moab, UT	Type of Flight Plan Filed:	None
Destination:	Casper, WY (CPR)	Type of Clearance:	None
Departure Time:		Type of Airspace:	Class G

The pilot requested a weather briefing from ForeFlight. He listed the destination as Casper/Natrona County International Airport (CPR), Casper, Wyoming, and indicated the departure would occur around 2000. Visual meteorological conditions were reported for the departure, route of flight, and destination.

A weather study revealed that moon rise occurred about 2023. Around 2027, the center of the moon's disk was about 0.32° above the horizon.

Airport Information

Airport:	Canyonlands Regional Airport KCNV	Runway Surface Type:	Asphalt
Airport Elevation:	4579 ft msl	Runway Surface Condition:	Dry;Rough
Runway Used:	21	IFR Approach:	None
Runway Length/Width:	7360 ft / 100 ft	VFR Approach/Landing:	None

CNV was located about 16 statute miles northwest of the nearest city of Moab, Utah. The area surrounding CNV was mostly unpopulated.

According to the airport manager, an inspection of the runway confirmed that the pilot-controlled runway lights were operational around the time of the departure.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	3 Fatal	Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	4 Fatal	Latitude, Longitude:	38.7517,-109.76998

The airplane came to rest on a hill at an elevation of about 4649 ft msl, on a heading of about 200° magnetic. A line of debris that included the nose and main landing gear assembly extended southwest about 540 ft and included two impact points. The first point of probable impact was a 12 ft by 24-inch gouge/indentation on a hill, at an elevation of about 4635 ft msl, and was consistent with only the nose landing gear impacting the terrain. About 50 ft northeast of this point were indications of contact by the right and then the left main landing gear. About 540 ft away was a second impact mark that was within about 40 ft of the final location of the main wreckage (Figure 1).



Figure 1. Google Earth image showing the first and second points of probable impact, and the location of the landing gear. The blue arrow points in the direction of travel.

The fuselage exhibited downward bending of the engine and cowling area. The right wing separated from the fuselage. The left wing remained attached to the fuselage but exhibited substantial damage. The nosewheel separated from the strut and was found in the first impact area. Both main landing gear assemblies, including the struts, separated from the fuselage. Flight control continuity was confirmed from the cockpit to the respective primary flight controls. Postaccident examination of the airframe and engine revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation.

Injuries to Persons

An autopsy of the pilot was performed by the Office of the Medical Examiner, Utah Department of Health and Human Services. The autopsy report was reviewed by the NTSB Investigator-In-Charge. According to the autopsy report, the cause of death was blunt force injuries, and the manner of death was accident.

The autopsy revealed mild coronary artery disease, which posed a slight hazard to flight safety. There was no forensic evidence that it likely contributed to this accident.

Additional Information

The Airplane Flying Handbook, FAA-H-8083-3C, Chapter 11 stated, in part:

The procedure for night takeoffs is the same as for normal daytime takeoffs except that many of the runway visual cues are not available. The pilot should check the flight instruments frequently during the takeoff to ensure proper airspeed, attitude, and heading. As the airspeed reaches the normal lift-off speed, the pilot adjusts the pitch attitude to establish a normal climb by referring to both outside visual references, such as lights, and to the flight instruments. After becoming airborne, the darkness of night often makes it difficult to note whether the airplane is getting closer to or farther from the surface. The attitude indicator, vertical speed indicator (VSI), and altimeter should all indicate a positive climb. It is also important to ensure the airspeed is at best climb speed.

The pilot makes necessary pitch and bank adjustments by referencing the attitude and heading indicators. It is recommended that turns not be made until reaching a safe maneuvering altitude. Although the use of the landing lights is helpful during the takeoff, they become ineffective after the airplane has climbed to an altitude where the light beam no longer extends to the surface. The light can cause distortion when it is reflected by haze, smoke, or clouds that might exist in the climb. Therefore, when the landing light is used for the takeoff, it should be turned off after the climb is well established provided it is not being used for collision avoidance.

Administrative Information

Investigator In Charge (IIC): Salazar, Fabian

Additional Participating Persons: Stephen Grover; Federal Aviation Administration; Salt Lake City, UT
Kathryn Whitaker; Piper Aircraft; Phoenix, AZ
Troy Helgeson; Lycoming Engines; Williams Port, PA

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Investigation Class: [Class 3](#)

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=193168>

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