Aviation Investigation Final Report

Location:	Venice, Florida	**Accident Number:**	ERA23FA079
Date & Time:	December 3, 2022, 19:38 Local	**Registration:**	N4676F
Aircraft:	Piper PA28	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was departing on a visual flight rules flight from an airport located on the coast of the Gulf of Mexico in dark night conditions. Flight track information revealed that the airplane took off toward the Gulf and climbed to a peak altitude of about 75 ft above ground level before entering a descent. During the descent, the airplane accelerated before the track data ended in the vicinity of the accident site, which was located in the water about 1,800 ft past the departure end of the runway.

Airport surveillance video from the time of the accident depicted an airplane departing with little to no angle of climb into a dark sky over dark water with no discernable horizon. Visual meteorological conditions prevailed at the airport at the time of the accident, with a broken cloud ceiling about 5,000 ft above ground level. Although the moon was above the horizon and about 83% of its visible disk was illuminated, it would have been located behind the pilot given the direction of the takeoff and was likely not readily visible due to the cloud ceiling.

Examination of the wreckage revealed no pre-impact mechanical anomalies.

The pilot began his flight training about 1 year before the accident, received his pilot certificate 4 months before the accident, and did not possess an instrument rating. The pilot had accrued 4.6 total hours of night-flying experience, 1.1 hours of which was accrued about 6 weeks before the accident, and his only night flight since receiving his pilot's certificate.

Since the pilot was not qualified for flight by reference to instruments, he would have been especially vulnerable to the onset of spatial disorientation when departing toward an area of open water devoid of cultural lighting. The flight track data and surveillance video were consistent with the pilot experiencing a form of spatial disorientation known as somatogravic illusion, in which the pilot incorrectly perceives the airplane's acceleration as increasing pitch

attitude. Such an illusion can be especially difficult to overcome because it typically occurs at low altitudes after takeoff, providing little time for recognition and subsequent corrective actions.

Probable Cause and Findings

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

The pilot's spatial disorientation during takeoff in dark night visual meteorological conditions, which resulted in his failure to maintain a positive rate of climb and a subsequent descent into the water.

Findings

Personnel issues	Spatial disorientation - Pilot
Environmental issues	Dark - Effect on personnel

Factual Information

History of Flight

Initial climb	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On December 3, 2022, at 1938 eastern standard time, a Piper PA-28-151, N4676F, was substantially damaged when it was involved in an accident near Venice, Florida. The private pilot and two passengers were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

Automatic Dependent Surveillance - Broadcast (ADS-B) data revealed that the airplane departed St. Pete-Clearwater International Airport (PIE), St. Petersburg, Florida, on the afternoon of the accident and flew to Venice Municipal Airport (VNC), Venice, Florida. The accident occurred during takeoff on the return flight to PIE while the airplane was operating under visual flight rules.

The airplane departed runway 23, which was 5,000 ft long. Flight track data showed that the airplane lifted from the runway at 1937:44, about 4,100 ft beyond the approach end of the runway at 88 knots (kts) groundspeed. Over the remaining 900 ft of runway, the airplane accelerated to 90 kts groundspeed and climbed to about 50 ft. Over the next 4 seconds, the track data showed two plots, both at an altitude of 75 ft, and at groundspeeds of 91 kts and 94 kts, respectively, before the airplane descended. At 1938:00, the final plot depicted the airplane at 0 ft and 109 kts groundspeed about 1,800 ft beyond the departure end of runway 23.

Airport surveillance video from the time of the accident depicted an airplane departing runway 23 with little to no angle of climb into a dark sky. The direction of takeoff would have resulted in the airplane traveling over dark water with no discernable horizon.

Pilot Information

Certificate:	Private	**Age:**	42,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	January 27, 2022
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	74.2 hours (Total, all aircraft), 67.6 hours (Total, this make and model)		

The pilot held a private pilot certificate with a rating for airplane single-engine land. His most recent Federal Aviation Administration (FAA) third-class medical certificate was issued January 27, 2022, and he declared 10 total hours of flight experience on that date. The pilot's logbook was not recovered.

The pilot rented the accident airplane from the same operator where he received his flight training. An FAA aviation safety inspector reviewed the pilot's rental and instruction record, which revealed that the pilot had accrued 74.2 total hours of flight experience, of which 67.6 were in the accident airplane make and model. The pilot obtained his private pilot certificate on July 31, 2022, and he had accrued 13.5 hours of flight experience since that date.

The pilot had accrued 4.6 total hours of night-flying experience, 1.1 hours of which was about 6 weeks before the accident and was his only night flight since receiving his pilot certificate.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N4676F
Model/Series:	PA28 151	**Aircraft Category:**	Airplane
Year of Manufacture:	1976	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	28-7715059
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	November 2, 2022 100 hour	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	70 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	7653 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	O-320-E3d
Registered Owner:	On file	**Rated Power:**	150 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	KVNC,19 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	19:35 Local	**Direction from Accident Site:**	47°
Lowest Cloud Condition:		**Visibility**	7 miles
Lowest Ceiling:	Broken / 5000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	70°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.28 inches Hg	**Temperature/Dew Point:**	23°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Venice, FL	**Type of Flight Plan Filed:**	None
Destination:	St. Petersburg, FL (PIE)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Dark night conditions prevailed around VNC at the time of the accident. The reported weather included wind from 070° at 7 knots, a broken cloud ceiling at 5,000 ft above ground level (agl), and 7 statute miles visibility. Additionally, the moon was above the horizon at an elevation of 60.37° and an azimuth of 127.17° with 83.7% of its disk illuminated.

Airport Information

Airport:	Venice Municipal Airport KVNC	**Runway Surface Type:**	Asphalt
Airport Elevation:	18 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	23	**IFR Approach:**	None
Runway Length/Width:	5000 ft / 150 ft	**VFR Approach/Landing:**	None

The airport was equipped with 2 runways oriented in a 13/31 and 5/23 configuration. Runway 23 was listed in the FAA Chart Supplement as the preferred calm wind runway.

The shoreline of the Gulf of Mexico was located about 1,300 ft from the departure end of runway 23. The airport was surrounded on its other three sides by densely-populated residential areas.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	27.063183,-82.450583(est)

Local emergency services and a commercial ocean salvage operator recovered most of the wreckage from the floor of the Gulf of Mexico, beneath about 15 ft of water. The engine, with propeller, engine mounts, firewall, and instrument panel attached, was found separated from the airplane and recovered as one piece. The cabin, containing the 2nd row seat, and the empennage with tail section attached, was raised along with both wings, which remained attached by torn metal, control cables, and wires. Both wings displayed uniform crushing along their respective leading edges. The crushing displayed signatures consistent with hydraulic deformation. The wreckage was moved to a secure facility for examination. Control continuity was confirmed from the flight controls, through cuts made by recovery personnel, to all control surfaces.

About 4 feet of the fuselage between the instrument panel and the main wing spar box, which contained the main cabin door, the front seats, and the fuel selector valve, was separated from the airframe and not recovered.

Visual examination of the engine revealed only minor impact damage to the intake and exhaust stacks, mufflers, and ignition P-leads. The carburetor mount was fractured and the carburetor remained attached by the throttle and mixture cables. The engine rocker box covers were removed to facilitate the examination. The propeller was rotated by hand and continuity was established through the powertrain to the valvetrain and the accessory section. Compression was confirmed on all cylinders using the thumb method. The magnetos were removed, flushed with alcohol, dried, and produced spark at all terminal leads when rotated.

The carburetor was disassembled. Examination revealed that the floats were intact, and no anomalies were noted. The oil suction screen was clean, unobstructed, and absent of debris. The engine exam revealed no pre-impact mechanical anomalies that would have prevented normal operation.

Medical and Pathological Information

Searches conducted by the United States Coast Guard and local law enforcement after the accident recovered the passengers on board the airplane, but the search for the pilot's remains was unsuccessful.

Additional Information

According to the FAA Pilot's Handbook of Aeronautical Knowledge, Chapter 17, Vestibular Illusions:

Somatogravic Illusion

A rapid acceleration, such as experienced during takeoff, stimulates the otolith organs in the same way as tilting the head backwards. This action may create what is known as the

“somatogravic illusion” of being in a nose-up attitude, especially in conditions with poor visual references. The disoriented pilot may push the aircraft into a nose-low or dive attitude.

According to FAA Publication AM-400-03/1, Spatial Disorientation:

The Head-Up Illusion involves a sudden forward linear acceleration during level flight where the pilot perceives the illusion that the nose of the airplane is pitching up. The pilot’s response to this illusion would be to push the yoke or the stick forward to pitch the nose of the aircraft down. A night takeoff from a well-lit airport into a totally dark sky (black hole) or a catapult take-off from and aircraft carrier can also lead to this illusion, and could result in a crash.

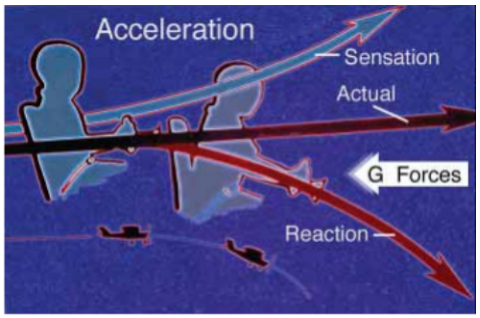

Figure 1 - Illustration paired with paragraph above in AM-400-03/1 (FAA).

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Rulon Vilcan; FAA/FSDO; Tampa, FL Troy Helgeson; Lycoming Engines; Williamsport, PA Damien Galbraith; Piper Aircraft; Vero Beach, FL
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