



Aviation Investigation Final Report

Location:	Redding, California	Accident Number:	WPR19FA025
Date & Time:	November 14, 2018, 18:27 Local	Registration:	N2629R
Aircraft:	Cessna 182	Aircraft Damage:	Substantial
Defining Event:	Loss of visual reference	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Before departing on the night instrument flight rules (IFR) flight, the pilot asked another pilot at the airport about the published IFR departure procedure he intended to use after takeoff. The pilot and passenger subsequently departed on the filed flight plan.

Radar data depicted that the accident airplane started to drift to the left of the runway while still flying over it. The left drift continued beyond the departure end of runway 34. About 0.43 mile north of the airport, the airplane began a right turn and started to descend from 500 ft above ground level (agl). The last radar target was located near the accident site, at an altitude of 100 ft agl. A video obtained from a security camera, located about 1 mile southwest of the accident site, captured the accident airplane in a descending right turn until the view of the airplane was lost behind a tree line.

A review of the pilot's flight records revealed that he held an instrument rating and had logged 3.6 hours in the last 6 months. However, there was no record of the pilot obtaining an instrument proficiency check within the 12 months before the accident. Examination of the airframe and engines did not reveal any anomalies consistent with a preimpact failure or malfunction.

It is likely that the pilot experienced some level of spatial disorientation as the airplane turned during takeoff in the dark night conditions with smoke and haze, which led to a loss of control and impact with terrain.

Probable Cause and Findings

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

The pilot's spatial disorientation and subsequent loss of control after takeoff in dark night instrument meteorological conditions.

Findings

Personnel issues	Spatial disorientation - Pilot
Personnel issues	Aircraft control - Pilot
Environmental issues	Haze/smoke - Effect on operation
Environmental issues	Dark - Effect on operation
Environmental issues	Below VFR minima - Decision related to condition
Environmental issues	Below VFR minima - Effect on personnel

Factual Information

History of Flight

Initial climb	Loss of visual reference (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On November 15, 2018 about 1827 Pacific standard time, a Cessna 182K airplane, N2629R, was destroyed when it was involved in an accident near Redding, California. The pilot and the passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot filed an instrument flight rules (IFR) flight plan from Redding Municipal Airport (RDD) to Sacramento Executive Airport (SAC), Sacramento, California, using the KENDL3 departure. According to a witness (another pilot who was at the same fixed base operator at RDD), before departure the pilot asked him “what is the KENDL3?”. The witness responded that he had just flown the HOMAN2 departure and suggested the pilot look at that departure instead. He informed the pilot he needed to make a right turn after departure. Shortly after, the witness heard over the radio that the pilot requested from the tower controller to change the flight plan from the KENDL3 departure to the HOMAN2 departure; however, the controller instructed the pilot to refile his flight plan or make their request with Oakland Center. The pilot then received the IFR clearance release as filed (with the KENDL3 departure). As the witness waited for his turn to take off, he noticed that, during the accident airplane’s initial climb, the pilot made a left turn instead of a right turn; he reported that the KENDL3 departure required a right turn immediately after departure.

Flight track data was obtained from L3/Harris OpsVue, a commercially available web-based product that aggregates and geo-reference's Federal Aviation Administration (FAA) surveillance data sources. The data revealed that the RDD air traffic controller cleared the accident pilot for takeoff on runway 34. Radar data depicted a primary target consistent with the accident airplane start to drift to the left of the runway while still flying over the runway. The left drift continued beyond the departure end of runway 34. The data further showed that the airplane began a right turn and started to descend from about 500 ft above ground level (agl), about 0.43 mile north of RDD. The last radar target was recorded near the accident site, at an altitude of 100 ft agl.

A video obtained from a security camera located on top of a building, about 1 mile southwest of the accident site, captured the accident airplane in a descending right turn until the view of the airplane was lost behind a tree line.

A witness, located about 660 ft southeast from the accident site, reported that he heard a sound consistent with the engine being advanced to full power. The witness turned around and observed the airplane's red and green wingtip lights. The witness said that the airplane appeared to be in level flight based on the lights; however, he could not see the airplane due to very low visibility and the dark environment. Shortly after, the witness observed wingtip lights "flipover as the airplane was in a roll"

and the airplane started descending straight toward the ground. The witness further stated that the "sound drastically decreased as if the engine power decreased," right before the airplane impacted the ground.

Pilot Information

Certificate:	Commercial	Age:	69
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 With waivers/limitations	Last FAA Medical Exam:	May 4, 2017
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 1773.8 hours (Total, all aircraft)		

Passenger Information

Certificate:		Age:	64
Airplane Rating(s):		Seat Occupied:	Right
Other Aircraft Rating(s):		Restraint Used:	
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	No
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Examination of the pilot's logbook revealed the first entry was dated January 22, 2015. As of that date, the pilot had accumulated a total of 1,628 flight hours; 191 of which were accumulated at night, and 72.2 were instrument flight hours. The last entry, dated October 16, 2018, indicated a total flight time of 1,773.8 hours, and the pilot had accumulated an additional 19 hours of night flight and 9.1 hours of actual instrument time. During the 6 months within that period, the pilot flew 3.6 hours of actual instrument time. In addition, the pilot flew to and from RDD twice; those flights were conducted during day visual flight rules conditions. There was no entry in the logbook that indicated the pilot flew any instrument departure procedure from RDD. His last flight review was conducted on May 28, 2018, and it included 4 landings and 1.3 hours of flight time; however, it did not appear that any of the flight time included night, actual instrument, or simulated instrument time.

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N2629R
Model/Series:	182 K	Aircraft Category:	Airplane
Year of Manufacture:	1967	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	18258329
Landing Gear Type:	Tricycle	Seats:	
Date/Type of Last Inspection:	March 3, 2017 100 hour	Certified Max Gross Wt.:	2348 lbs
Time Since Last Inspection:	169 Hrs	Engines:	1 Reciprocating
Airframe Total Time:		Engine Manufacturer:	Continental
ELT:		Engine Model/Series:	O-520FTS
Registered Owner:		Rated Power:	
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Night
Observation Facility, Elevation:	KRDD, 497 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	01:53 Local	Direction from Accident Site:	233°
Lowest Cloud Condition:	Scattered / 2800 ft AGL	Visibility	
Lowest Ceiling:		Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.07 inches Hg	Temperature/Dew Point:	13°C / -4°C
Precipitation and Obscuration:	Moderate - None - Haze		
Departure Point:	Redding, CA (RDD)	Type of Flight Plan Filed:	IFR
Destination:	Sacramento, CA (SAC)	Type of Clearance:	IFR
Departure Time:		Type of Airspace:	

Sunset occurred at 1651 on the day of the accident and civil twilight ended at 1721. Weather conditions at the time were instrument meteorological conditions (IMC), because of smoke and haze from a nearby forest fire.

Ten minutes after the accident, RDD reported calm wind, prevailing visibility of 2 1/2 miles, haze, smoke, ceiling broken at 2,700 feet agl.

AIRMET SIERRA, issued at 1421, for IFR conditions, was active for an area immediately south of the accident location at the accident time.

The Terminal Aerodrome Forecast issued at 1553 for RDD, forecasted for the time of the accident: a variable wind of 4 knots, visibility of 3 miles, smoke, haze, sky clear; temporary conditions: visibility of 2 statute miles, smoke, haze, ceiling overcast at 1,500 ft.

At 1701, Geostationary Operational Environmental Satellite (GOES)-16 data report depicted a smoke/aerosol cloud over central Northern California with the northern-most portion of the cloud over the accident location.

Airport Information

Airport:	REDDING MUNI RDD	Runway Surface Type:	Asphalt
Airport Elevation:	504 ft msl	Runway Surface Condition:	
Runway Used:	34	IFR Approach:	None
Runway Length/Width:	7003 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	40.526943,-122.283607(est)

The initial examination of the accident site revealed that the airplane impacted terrain .75-mile northeast of the departure end of runway 34 and cartwheeled before coming to rest upright. The wreckage was spread along a 275-ft-long debris path through dry, grassy terrain on an approximate heading of 115° magnetic.

The first point of impact (FPOI) was a ground scar about 12 inches long, which contained a piece of right-wing structure. Pieces of the outboard right wing were scattered along the path from the FPOI to the main wreckage, which was located about 280 ft southeast from the FPOI. The main wreckage

consisted of the engine, the majority of both wings, cabin, fuselage, and the empennage. The engine was separated from the firewall and exhibited numerous impact signatures.

The firewall and the instrument panel were crushed together and compressed downward; the instrument panel exhibited extensive damage. The carburetor heat lever was observed fully in. The throttle lever was observed $\frac{3}{4}$ out. The master switch was on and the ignition key was in the off position. Both cabin doors were detached from the fuselage and located along the debris path. The left and right wings exhibited leading edge crush damage over the full length of the wings. Both wings remained partially attached to the fuselage through cables, except for the aileron balance cable that was separated due to overstress. Both fuel tanks were breached in multiple locations, and a strong odor of fuel was present at the site. In addition, both wings had fuel splash marks on their surfaces. The vertical stabilizer, rudder, horizontal stabilizer, and elevators remained attached to the empennage. Flight control cable continuity was established from the control surface bell cranks to the cockpit area. The flap actuator was measured and found to be in the up position. The elevator trim tab actuator was measured and found to be in the 10° tab up position.

The three-blade propeller was located about 164 ft from the FPOI and 109 ft from the main wreckage. All three blades were observed with tip damage, large leading-edge gouging and polishing. One blade was bent aft and had a piece of the No. 5 cylinder rocker arm imbedded in the leading edge. The spinner was crush damaged around the hub. The engine was rotated manually and all rocker arms, valve springs, and valves moved normally except cylinder No. 5 whose rocker arms separated, and the intake valve stem was bent due to impact forces. There was corresponding movement of the accessory gear in the rear of the engine when the engine was rotated. The top and bottom spark plug electrodes displayed coloration consistent with normal operation. The left magneto produced spark at all leads. The right magneto's electronic ignition module was impact damaged and could not be tested. There was no evidence of pre-impact mechanical anomalies or malfunctions of the engine or the airframe.

The Engine Data Monitor (EDM) unit was recovered from the wreckage and sent to the NTSB Vehicle Recorders Laboratory for examination. No unusual data were recovered from the unit.

Additional Information

FAA Regulation, Part 61.57 (c), states the following:

no person may act as pilot-in-command under instrument flight rules (IFR) or in weather less than the minimum prescribed for visual flight rules (VFR), unless within the preceding 12 months that person has completed an instrument proficiency check, and within the preceding 6 calendar months, that person has logged at least 6 instrument approaches, holding procedures, and intercepting and tracking courses through the use of navigation systems.

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." 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-8083-3A) 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 the attitude of the airplane, 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.

Medical and Pathological Information

The Shasta County Medical Examiner's Office, Shasta, California, performed an autopsy of the pilot and the passenger. The cause of death for both was blunt trauma. No significant natural diseases were identified.

The FAA's Forensic Sciences Laboratory conducted toxicology tests on specimens from the pilot and the passenger. The results were negative for all tests performed; no drugs were identified in blood and no potentially impairing substances were found in urine, liver, or muscle.

Administrative Information

Investigator In Charge (IIC):	Smith, Maja		
Additional Participating Persons:	Mike Council; Continental Motors; Mobile, AL Joseph Mitchell; FAA; Sacramento, CA Ricardo Asensio; Textron Aviation; Wichita, KS		
Original Publish Date:	February 2, 2021	Investigation Class:	2
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=98642		

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](#).