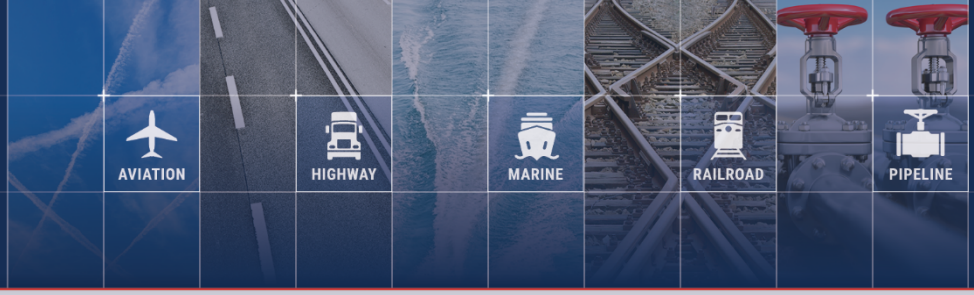

Aviation Investigation Final Report

Location:	Evanston, Wyoming	**Accident Number:**	CEN18FA101
Date & Time:	February 18, 2018, 15:05 Local	**Registration:**	N700VX
Aircraft:	Socata TBM 700	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The commercial pilot was conducting an instrument approach following a 3.5-hour cross-country instrument flight rules (IFR) flight in a single-engine turboprop airplane. About 1.6 miles from the runway threshold, the airplane began a climb consistent with the published missed approach procedure; however, rather than completing the slight left climbing turn toward the designated holding point, the airplane continued in an approximate 270° left turn, during which the airplane's altitude varied, before entering a descending right turn and impacting terrain. Tree and ground impact signatures were consistent with a 60° nose-low attitude at the time of impact. No distress calls were received or recorded from the accident flight. A postimpact fire consumed a majority of the cockpit and fuselage.

Weather information for the time of the accident revealed that the pilot was operating in IFR to low IFR conditions with gusting surface winds, light to heavy snow, mist, cloud ceilings between 700 and 1,400 ft above ground level with clouds extending through 18,500 ft, and the potential for low-level wind shear and clear air turbulence. The area of the accident site was under AIRMETs for IFR conditions, mountain obscuration, moderate icing below 20,000 ft, and moderate turbulence below 18,000 ft. In addition, a winter storm warning was issued about 6 hours before the flight departed. Although the pilot received a weather briefing about 17 hours before the accident, there was no indication that he obtained updated weather information before departure or during the accident flight.

Examination of the airframe and engine did not reveal any preimpact anomalies that would have precluded normal operation; however, the extent of the fire damage precluded examination of the avionics system. The airplane was equipped with standby flight instruments.

An acquaintance of the pilot reported that the pilot had experienced an avionics malfunction several months before the accident during which the airplane's flight display went blank while flying an instrument approach. During that occurrence, the pilot used ForeFlight on his iPad to maneuver back to the northeast and fly the approach again using his own navigation. During the accident flight, the airplane appeared to go missed approach, but rather than fly the published missed approach procedure, the airplane also turned left towards to northeast. However, it could not be determined if the pilot's

actions were an attempt to fly the approach using his own navigation or if he was experiencing spatial disorientation.

The restricted visibility and turbulence present at the time of the accident provided conditions conducive to the development of spatial disorientation. Additionally, the airplane's turning flight track and steep descent profile are consistent with the known effects of spatial disorientation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's loss of control due to spatial disorientation.

Findings

Personnel issues	Spatial disorientation - Pilot
Aircraft	(general) - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Environmental issues	Below VFR minima - Effect on operation
Environmental issues	Below VFR minima - Decision related to condition

Factual Information

History of Flight

Approach-IFR missed approach	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On February 18, 2018, about 1505 mountain standard time, a Socata TBM-700A airplane, N700VX, impacted terrain during an instrument approach to Evanston-Uinta County Airport/Burns Field (EVW), Evanston, Wyoming. The commercial pilot and passenger were fatally injured, and the airplane was destroyed. The airplane was privately owned and operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Instrument meteorological conditions existed at the airport, and the flight operated on an instrument flight rules (IFR) flight plan. The flight departed Tulsa International Airport (TUL), Tulsa, Oklahoma, about 1210 central standard time (1110 mountain standard time).

Radar and air traffic control information provided by the Federal Aviation Administration (FAA) captured the accident flight as it progressed. Initially, the pilot filed Centennial Airport, Englewood, Colorado, as the flight's destination. About 20 minutes after takeoff, the pilot requested to change the destination to Pueblo Memorial Airport (PUB), Pueblo, Colorado. An hour and 20 minutes later, the pilot again requested to change his destination to Provo Municipal Airport (PVU) due to weather. At 1353, the pilot requested to make EVW his new destination stating that EVW was below minimums when he departed, but that the weather had improved. At 1422, the controller asked the pilot if he had the weather information for EVW, and the pilot responded that he did.

The pilot requested and was subsequently cleared for the ILS RWY 23 approach to EVW starting at the FBR VOR initial approach fix. The pilot was initially cleared to FBR at 15,000 ft mean sea level (msl) which the pilot acknowledged. However, while proceeding to FBR, the controller issued several low altitude alerts which the pilot initially did not respond to with the airplane having descended down to 14,400 ft msl. The pilot responded that he was bouncing around and the autopilot was trying to maintain 15,000 ft msl.

Later, the airplane was cleared to cross FBR at or above 10,000 ft msl, and then cleared for the ILS 23 approach. At 1459, the airplane crossed the final approach fix and descended for the approach. At 1502:07, the airplane was at 7,300 ft msl, just below the approach's decision height of 7,343 ft, and about 1.6 nautical miles from the runway threshold. The airplane then climbed past 7,700 ft msl and entered a left, 270° turn, during which the airplane climbed and descended. The airplane then entered a right turn before radar contact was lost at an altitude of 7,900 ft msl. The published missed approach procedure included a straight-ahead climb to 7,600 ft, then a climbing, slight left turn toward a designated holding point about 17 nautical miles southwest of EVW.

Several residents heard the airplane and the sound of the impact and called emergency responders, who dispatched to the accident site. A postimpact fire consumed large portions of the fuselage and wings.

Pilot Information

Certificate:	Commercial	**Age:**	71,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	October 19, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	4154 hours (Total, all aircraft), 100 hours (Total, this make and model)		

According to airplane maintenance log entries and logged instrument flight plans, the pilot had at least 90 hours in the airplane make and model.

Aircraft and Owner/Operator Information

Aircraft Make:	Socata	**Registration:**	N700VX
Model/Series:	TBM 700 A	**Aircraft Category:**	Airplane
Year of Manufacture:	1997	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	118
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	September 27, 2017 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Turbo prop
Airframe Total Time:	3966.5 Hrs as of last inspection	**Engine Manufacturer:**	P&W
ELT:	Installed, not activated	**Engine Model/Series:**	PT6A SER
Registered Owner:	On file	**Rated Power:**	700 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was manufactured in 1997 and was modified under supplemental type certificate with an MT Propeller MTV-21-1-E 5-bladed propeller and a Garmin G600 avionics system, which included digital primary flight and multifunction displays. Standby instruments were available on the right outermost portion of the instrument panel. The most recent maintenance was a 200-hour inspection completed on September 27, 2017, at a Hobbs meter time of 3,966.5 hours. The pilot purchased the airplane in June 2017.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KEVW,7163 ft msl	**Distance from Accident Site:**	2 Nautical Miles
Observation Time:	14:53 Local	**Direction from Accident Site:**	248°
Lowest Cloud Condition:		**Visibility**	
Lowest Ceiling:	Indefinite (V V) / 800 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	340°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.46 inches Hg	**Temperature/Dew Point:**	-3°C / -3°C
Precipitation and Obscuration:	Moderate - None - Snow		
Departure Point:	TULSA, OK (TUL)	**Type of Flight Plan Filed:**	IFR
Destination:	Evanston, WY (EVW)	**Type of Clearance:**	IFR
Departure Time:	12:10 Local	**Type of Airspace:**	

A weather study was conducted by an National Transportation Safety Board (NTSB) meteorologist. At 0432 on the morning of the accident, the National Weather Service (NWS) issued a Winter Storm Warning for Uinta County, which included Evanston, Wyoming, and warned heavy snow was likely to start at 0900, with total snow accumulation of 8 to 14 inches. At 1227, the NWS Storm Prediction Center identified an area of potential convective activity that encompassed the Evanston area. At 1400, an NWS Surface Analysis Chart recorded a cold frontal boundary extending from just south of the accident site through Utah and into Nevada.

At 1420, before the pilot initiated the approach, the conditions reported by the automated surface observing system (ASOS) at EVW included wind from 290° at 17 knots, 2 miles visibility, light snow and mist, broken clouds at 2,400 ft above ground level (agl), overcast clouds at 3,600 ft agl, temperature 0°C, dew point -2°C, and an altimeter setting of 29.47 inches of mercury. Peak wind was observed from 260° at 32 knots at 1401.

About the time the airplane passed the intermediate fix on the approach, the ASOS reported 3/4-mile visibility with light snow and mist and a broken ceiling at 700 ft agl. Twelve minutes later, and prior to the airplane crossing the final approach fix, the ASOS reported 1/4-mile visibility with snow, freezing fog, and a vertical visibility of 800 ft. Of note, the minimum weather needed to fly the ILS RWY 23 approach is 200 ft and 1/2-mile visibility for all category of aircraft. About the time the airplane began the missed approach, the ASOS reported wind from 350° at 14 knots, 1/2 mile visibility in snow and freezing fog and a vertical visibility of 800 ft.

A review of the 1- and 5-minute interval recording of ASOS data indicated IFR to low instrument flight rules (LIFR) conditions, gusty surface winds, light to heavy snow, and ceilings between 700 to 1,400 ft agl at the time of the accident.

A High-Resolution Rapid Refresh model sounding indicated the possibility of low-level wind shear from the surface to 9,500 ft msl and clear air turbulence above 8,000 ft msl.

A search of official weather briefing sources (such as Leidos Flight Service and Direct User Access Terminal Service) revealed that the pilot did not request a weather briefing from those sources. However, a search of archived ForeFlight information indicated that the accident pilot received a weather briefing package from ForeFlight at 1934 the day before the accident, prior to the release of the significant weather. Most of the information related to the winter storm was issued on the morning of the accident. Foreflight is still able to obtain weather through various means while in flight; however, no record is maintaining of the information accessed. Of note, the pilot changed his destination several times inflight citing weather information. It is not known how the pilot was obtaining those weather updates.

Additional weather information is located in the docket of this report.

Airport Information

Airport:	EVANSTON-UINTA COUNTY BURNS FI EVW	**Runway Surface Type:**	Asphalt
Airport Elevation:	7142 ft msl	**Runway Surface Condition:**	
Runway Used:	23	**IFR Approach:**	ILS
Runway Length/Width:	7300 ft / 100 ft	**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	Unknown
Total Injuries:	2 Fatal	**Latitude, Longitude:**	41.288055,-110.981941

The first impact point was identified in several trees. The right wingtip was found near one of the trees. The angle of impact was estimated at 60° nose low on a magnetic heading of 358°. The ground impact point was identified by a small divot followed by the engine. The main wreckage comprised the fuselage, empennage, and left wing. A post-impact fire consumed most of the cockpit and forward fuselage. The right wing was displaced from the fuselage and came to rest on the right side of the debris area. All major components of the airplane were located at the accident site. Flight control continuity was established from the cockpit controls to all primary flight control surfaces. Flap jackscrew positions were consistent with a flaps setting of 34°, which was consistent with a landing configuration. Landing gear actuator positions indicated that the landing gear were retracted. The avionics and cockpit switches were impact damaged and either partially or totally consumed by the postimpact fire.

The engine was removed and examined. Fire and impact damage precluded functional testing of the major components; however, disassembly revealed circumferential rubbing and smearing of fan discs in multiple stages of the engine, including the compressor and turbine section, consistent with the engine producing power at the time of impact. No preimpact anomalies of the engine were found.

Medical and Pathological Information

An autopsy on the pilot by an independent pathologist revealed mild-to-moderate coronary artery disease with no blood clots and no evidence of a recent or remote heart attack. The pulmonary circulation was unremarkable, but the cerebral circulation was not available for examination. Multiple gallstones were present, but there was no reported obstruction or inflammation. The cause of death was listed as multiple traumatic and thermal injuries.

The FAA's Forensic Sciences Laboratory performed toxicology testing on specimens from the pilot. Results were negative for all tested for substances.

Additional Information

Interview with the Airport Manager

The EVW airport manager stated that the pilot had told him of a flight, several months before the accident, during which the airplane's flight display went blank during an instrument approach. On that day, the weather was marginal visual flight rules with light snow, and the pilot had ForeFlight on his iPad, which he used to make a left turn back toward the northeast and set up to fly the approach again. The pilot said he was going to have an avionics shop troubleshoot the issue. The airport manager did not hear anything further about an avionics problem, and review of the airplane's maintenance log did not find any recorded entry for avionics work.

The airport manager stated that, around 1455 on the day of the accident, he heard what he assumed to be the accident airplane click the mic 5 times, then a few seconds later, click the mic 3 times on the airport's common traffic advisory frequency, consistent with the pilot activating the airport's pilot-controlled lighting system. A few minutes later, he heard a 10-second transmission during which he thought he could hear a woman's voice in the background before the transmission ended. There was no distress call.

Spatial Disorientation

The FAA Civil Aeromedical Institute's publication, "Introduction to Aviation Physiology," defines spatial disorientation as a loss of proper bearings or a 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 instrument meteorological conditions (IMC), frequent transfer between VMC and IMC, and unperceived changes in aircraft attitude.

The FAA Pilot's Handbook of Aeronautical Knowledge, chapter 16,

Aeromedical Factors," stated, "Under normal flight conditions, when there is a visual reference to the horizon and ground, the sensory system in the inner ear helps to identify the pitch, roll, and yaw movements of the aircraft. When visual contact with the horizon is lost, the vestibular system becomes unreliable. Without visual references outside the aircraft, there are many situations in which normal motions and forces create convincing illusions that are difficult to overcome…Unless a pilot has many hours of training in instrument flight, flight should be avoided in reduced visibility or at night when the horizon is not visible. A pilot can reduce susceptibility to disorienting illusions through training and awareness and learning to rely totally on flight instruments.

Administrative Information

Investigator In Charge (IIC):	Aguilera, Jason
Additional Participating Persons:	John Consanza; FAA FSDO; Salt Lake City, UT
Original Publish Date:	November 6, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96753