Aviation Investigation Final Report

Location:	San Antonio, Texas	**Accident Number:**	CEN17FA084
Date & Time:	January 25, 2017, 15:39 Local	**Registration:**	N401SC
Aircraft:	CIRRUS DESIGN CORP SR22	**Aircraft Damage:**	Destroyed
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was maneuvering in the airport traffic pattern at the time of the accident. The pilot entered a continuous right turn from downwind toward the final approach course when he abruptly lost control. A witness stated that the airplane wings were "totally vertical" before it nosed over and descended toward the ground. A second witness also reported that the airplane wings were nearly vertical before it descended below the tree line. He added that the engine sounded "fine."

An NTSB performance study revealed that after the airplane entered the airport traffic pattern, it began a continuous right turn from downwind toward the final approach course suggesting that the pilot did not fly a traditional rectangular traffic pattern, but instead flew a circling base to final pattern. The airplane approached the extended runway centerline in a 48° right bank, at 103 kts and about 220 ft agl. Lateral accelerations began to increase shortly before the accident and varied between 0.37g and 0.62g for the final portion of the flight. The lateral accelerations were consistent with sideslip angles of 15° to 20° during the final turn. The calculated angle-of-attack (AOA) of the wing subsequently exceeded the critical AOA and the airplane entered a descent which ultimately reached 1,800 fpm. Although the pilot's control inputs were not directly recorded, the large lateral accelerations are consistent with left rudder input and an uncoordinated flight condition for the airplane.

The accident site was located in a wooded area about 1/2 mile southeast from the landing runway threshold. Airframe and engine examinations did not reveal evidence of any anomalies consistent with a preimpact failure or malfunction.

The Pilot's Operating Handbook noted that extreme care must be taken to avoid uncoordinated or accelerated control inputs when close to the stall, especially when close to the ground. If, at the stall, the flight controls are misapplied and accelerated inputs are made to the elevator, rudder, and/or ailerons, an abrupt wing drop may be felt and a spiral or spin may be entered.

The FAA Airplane Flying Handbook (FAA-H-8083-3B) noted that coordinated flight is important to

maintaining control of the airplane. Situations can develop when a pilot is flying in uncoordinated flight and depending on the flight control deflections, may support pro-spin flight control inputs. This is especially hazardous when operating at low altitudes, such as in the airport traffic pattern. A cross-control stall occurs when the critical AOA is exceeded with aileron pressure applied in one direction and rudder pressure in the opposite direction, causing uncoordinated flight. The aerodynamic effects of an uncoordinated, cross-control stall can occur with very little warning and can be deadly if it occurs close to the ground. The nose may pitch down, the bank angle may suddenly change, and the airplane may continue to roll to an inverted position, which is usually the beginning of a spin.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's uncoordinated flight control inputs and subsequent inadvertent cross-control aerodynamic stall in the airport traffic pattern that resulted in a loss of control and uncontrolled descent with insufficient altitude for recovery.

Findings

Aircraft	Yaw control - Incorrect use/operation
Aircraft	Angle of attack - Capability exceeded
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Approach-VFR pattern final	Aerodynamic stall/spin (Defining event)
Approach-VFR pattern final	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On January 25, 2017, at 1539 central standard time, a Cirrus Design SR-22 airplane, N401SC, was destroyed during an in-flight collision with trees and terrain about 1 mile southeast of the Stinson Municipal Airport (SSF), San Antonio, Texas. The pilot was fatally injured. The airplane was registered to and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which was not operated on a flight plan. The flight originated from the San Antonio International Airport (SAT) at 1533. The intended destination was SSF.

Federal Aviation Administration (FAA) air traffic control (ATC) radar data indicated that the flight departed from runway 4 at SAT and proceeded southbound toward SSF at an altitude of about 2,500 feet mean sea level (msl). At 1536, the pilot contacted the SSF control tower and informed the controller that the flight was 8 miles north of SSF. The controller instructed the pilot to enter a right downwind for landing on runway 32. At 1538, the SSF tower controller cleared the pilot to land. The controller subsequently observed the airplane turn from downwind to base in the traffic pattern. He did not observe the accident sequence itself.

A witness reported observing the airplane from the opposite side of the San Antonio River. The airplane's wings were "totally vertical." The airplane appeared to be on a northeast heading and to be losing altitude at that time. The airplane subsequently nosed over and descended toward the ground.

A second witness observed the airplane for about 2 seconds before it descended below the tree line. The airplane appeared to be northbound with the wings oriented nearly vertical. The airplane's altitude appeared to be relatively constant during the brief time he observed it; however, it appeared to be moving more slowly than other airplanes he had seen flying in the area. The engine sounded "fine;" although, somewhat louder than other airplanes possibly because it was lower than other airplanes.

An NTSB airplane performance study was completed based on data recovered from the airplane avionics system. The airplane entered the SSF traffic pattern about 1,400 ft msl and 117 knots calibrated airspeed (KCAS). The airplane slowed to about 95 KCAS and descended to about 1,200 ft msl on the downwind traffic pattern leg. The airplane subsequently entered a continuous right turn from downwind toward final approach to runway 32. The data suggested that the pilot did not fly a traditional rectangular traffic pattern, but instead flew a circling base to final pattern.

About 1539:44, the airplane appeared to level briefly before beginning a shallow climb. The data suggested that the airplane was approaching the extended runway 32 centerline at an airspeed of 103 KCAS, an altitude of 796 ft msl, and in an approximate 48° right bank. About one second later, the

airplane entered a descent which ultimately exceeded 1,800 fpm.

Lateral accelerations began to increase about 1539:41 and reached 0.49g about 1539:45. The accelerations varied between 0.37g and 0.62g for the remainder of the dataset. The recorded lateral accelerations were consistent with sideslip angles of 15° to 20° during the final turn. The calculated angle-of-attack (AOA) of the wing exceeded the critical AOA of 24° about 1539:48. Shortly afterward, the descent rate of 1,800 fpm was recorded. Although the pilot's control inputs were not directly recorded, the large lateral accelerations are consistent with left rudder input and an uncoordinated flight condition for the airplane.

Pilot Information

Certificate:	Commercial	**Age:**	32,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	September 22, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	2556 hours (Total, all aircraft)		

The pilot held a FAA commercial pilot certificate with single-engine and multi-engine land airplane, and instrument airplane ratings. He was also a current U.S. Air Force pilot. He had passed a flight duty medical examination in September 2016, which satisfied the requirement for a FAA medical certificate in accordance with 14 CFR 61.23 (b)(9).

U.S. Air Force records revealed that the pilot had accumulated 2,411.7 hours total military flight time, with the majority of that in B-1B airplanes. On his most recent application for a FAA medical certificate, dated July 2006, the pilot reported a total civilian flight time of 145 hours. The pilot's civilian logbook was not available to the NTSB.

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N401SC
Model/Series:	SR22	**Aircraft Category:**	Airplane
Year of Manufacture:	2004	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	0951
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	January 24, 2017 Annual	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:	1 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1124.6 Hrs at time of accident	**Engine Manufacturer:**	CONT MOTOR
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-550-N-27
Registered Owner:	On file	**Rated Power:**	310 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was issued a FAA airworthiness certificate in June 2004. It was purchased by the pilot and a co owner in June 2016. Airplane maintenance records revealed that the most recent annual inspection was completed on January 24, 2017, the day before the accident, at an airframe total time of 1,123.3 hours. At the time of the accident, the airplane had accumulated 1,124.6 hours.

A friend of the pilot reported that he had flown the airplane in December 2016. While in cruise flight at 7,500 feet, the stall warning activated and the autopilot disengaged. Maintenance documentation, dated December 8, 2016, noted that the stall warning line was blocked. The blockage was removed, and the stall warning system was tested and determined to be operational.

The stall speeds published in the Pilot's Operating Handbook (POH) are 70 KCAS at a bank angle of 45° and 84 KCAS at a bank angle of 60°, with the wing flaps full down (100%) and a forward center-of-gravity. The stall speed data is applicable when the engine power is at idle, and the airplane is in a level flight attitude at a maximum gross weight of 3,400 lbs. The published stall speeds are also contingent on coordinated flight and do not account for the adverse effects of sideslip, which was experienced during the final turn.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SSF,577 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	315°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	10°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.92 inches Hg	**Temperature/Dew Point:**	21°C / -6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Antonio, TX (SAT)	**Type of Flight Plan Filed:**	None
Destination:	San Antonio, TX (SSF)	**Type of Clearance:**	VFR
Departure Time:	15:32 Local	**Type of Airspace:**	Class D

Visual meteorological condition prevailed at the time of the accident with the surface wind from 010° at 12 knots. The wind aloft at 3,000 ft was forecast to be from 030° at 18 knots. An Airmen's Meteorological Information (AIRMET) advisory was in effect for the possibility of moderate turbulence below 18,000 ft. At 1228, a pilot reported moderate turbulence about 15 miles northwest of SAT between 9,000 ft and 7,500 ft. No other pilot reports for turbulence below 18,000 ft within 100 miles of SAT were on file.

Airport Information

Airport:	Stinson Municipal SSF	**Runway Surface Type:**	Asphalt
Airport Elevation:	577 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	32	**IFR Approach:**	None
Runway Length/Width:	4128 ft / 100 ft	**VFR Approach/Landing:**	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	29.326944,-98.458053

The airplane impacted a wooded area about one-half mile southeast of the runway 32 arrival threshold. Tree breaks began about 105 ft from the airplane wreckage. The impact path was oriented on an approximate 050° bearing. A ground impact mark was located about 30 ft from the airplane wreckage along the impact/debris path. The airplane came to rest upright on an approximate bearing of 270°.

Airframe and engine examinations did not reveal any anomalies consistent with a pre-impact failure or malfunction. A detailed summary of the examinations is included in the docket associated with the investigation.

Medical and Pathological Information

The Bexar County Medical Examiner, San Antonio, Texas, performed an autopsy and attributed the pilot's death to blunt forces injuries sustained in the accident. Toxicology testing performed by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, was negative for all substances in the testing profile.

Additional Information

The Cirrus Design SR-22 Pilot's Operating Handbook stated that the airplane stall characteristics are conventional. Power-off stalls may be accompanied by a slight nose bobbing if full aft stick is held. Power-on stalls are marked by a high sink rate at full aft stick. Extreme care must be taken to avoid uncoordinated or accelerated control inputs when close to the stall, especially when close to the ground. If, at the stall, the flight controls are misapplied and accelerated inputs are made to the elevator, rudder, and/or ailerons, an abrupt wing drop may be felt and a spiral or spin may be entered.

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Administrative Information

Investigator In Charge (IIC):	Sorensen, Timothy
Additional Participating Persons:	Jeffrey W Burns; FAA Flight Standards; San Antonio, TX Brad Miller; Cirrus Aircraft; Duluth, MN Chris Lang; Continental Motors Inc.; Mobile, AL
Original Publish Date:	November 5, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=94649