Aviation Investigation Final Report

Location:	Xenia, Ohio	**Accident Number:**	CEN16FA095
Date & Time:	January 26, 2016, 17:54 Local	**Registration:**	N1703
Aircraft:	CIRRUS DESIGN CORP SR22T	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

The airline transport pilot was repositioning the airplane to its home base after maintenance was completed at a repair station. The pilot filed an instrument flight rules (IFR) flight plan with a cruise altitude of 9,000 ft mean sea level (msl). The en route portion of the flight to the destination was uneventful. Before descending to approach altitude, the pilot contacted approach control and reported that he had received weather information for the destination airport. The pilot then requested and was given clearance to fly the area navigation (RNAV) approach to runway 7. Approach control cleared the pilot to descend to 3,000 ft msl and issued pilot reports for icing. The pilot flew the RNAV approach to runway 7, tracking inbound to the airport on the published approach course. About 5.8 miles from the airport, the pilot cancelled his IFR clearance and continued inbound under visual flight rules. His recorded altitude at the time of IFR cancellation was 2,700 ft msl. Reported weather at the airport at the time of the accident included a ceiling of 1,700 ft above ground level (2,649 ft msl) and wind from 240 degrees at 9 kts, gusting to 14 kts, and variable from 240 to 330 degrees. One witness at the airport saw the airplane enter a downwind leg to land into the wind on runway 25. As the airplane began its turn from the base leg to final, several other witnesses saw it nose down and descend to impact in wooded terrain about 300 ft short of the runway threshold.

A postaccident weather study showed high icing potential within the cloud layers above the surface and a likelihood of moderate or greater icing along the airplane's route of flight until the airplane descended below the cloud ceiling. Because the surface temperature was below freezing, any structural ice that built up on the airplane while it descended through the clouds would not have melted after the airplane descended below the cloud ceiling.

An examination of the airplane revealed no preimpact mechanical malfunctions or anomalies that would have precluded normal operations. Data recovered from the airplane's Remote Data Module showed that the airplane's anti-ice tank switch was turned on about 7 minutes 30 seconds before the accident and remained on for 1 minute 50 seconds. The switch was then turned off and remained off for the remainder of the flight. The airplane's flaps were extended to the "HALF" position about 2 minutes 50

seconds before the accident. Just before the data ended, the airplane's pitch and bank increased, and the stall warning activated. In the last 3 seconds of data, the airplane's bank angle was 48 to 50 degrees, and the indicated airspeed was between 87 and 90 kts. The Pilot's Operating Handbook for the airplane showed that at 60 degrees of bank with half flaps, the airplane's stall speed was 95 kts. It is possible that, during the approach, ice accumulated on the airplane, which may have increased the airplane's stall speed. However, regardless of whether or not structural ice was present, during the turn to final, the pilot allowed the airspeed to decrease below the airplane's published stall speed. As a result, the wing's critical angle-of-attack was exceeded, and the airplane entered an aerodynamic stall and departed controlled flight.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain adequate airspeed while turning from the base leg to final, which resulted in the wing's critical angle-of-attack being exceeded and a subsequent aerodynamic stall.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained
Environmental issues	Conducive to structural icing - Effect on equipment

Factual Information

History of Flight

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

On January 26, 2016, about 1754 eastern standard time, a Cirrus Design Corporation SR22T single engine airplane, N1703, impacted terrain during the turn to final approach to runway 25 at the Greene County - Lewis A. Jackson Regional Airport (I19), Xenia, Ohio. The pilot, who was the sole occupant and operator of the airplane, sustained fatal injuries, and the airplane was substantially damaged. The airplane was registered to Weaver Aircraft LLC of Carmel, Indiana, and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a positioning flight. Visual meteorological conditions (VMC) prevailed in the area during the approach and an instrument flight rules (IFR) flight plan was filed. The flight originated about 1700 from the Indianapolis Executive Airport (TYQ), Indianapolis, Indiana, and I19 was its planned destination.

The purpose of the flight was to reposition the airplane to its home base of Xenia, Ohio, after having completed maintenance at a repair station. Information provided by the Federal Aviation Administration (FAA) showed that the pilot filed an IFR flight plan from TYQ, flying at 9,000 ft enroute to I19. After a normal IFR flight from TYQ, the pilot contacted Middletown [Ohio] Radar Approach Control and reported having received the weather for I19. He then requested and was given clearance to fly the RNAV 7 instrument approach into I19.

The pilot was cleared from 9,000 ft to 3,000 ft. The Middletown Approach controller issued pilot reports for icing.

The pilot flew the RNAV approach to runway 7 tracking inbound to the airport on the published approach course of 068 degrees. About 5.8 miles from the airport, the pilot cancelled his IFR clearance and continued inbound under visual flight rules (VFR). His recorded altitude at that time was 2,700 ft. The pilot was then instructed to change to advisory frequency.

An airport employee, who witnessed the airplane flying on a downwind beneath the cloud base, stated that the airplane appeared to be setting up for a circling visual approach to runway 25. The airport employee was in proximity to the I19 Automated Weather Observation System (AWOS) weather information screen. He reported that the screen showed a 1,700 ft cloud ceiling with wind from 240 degrees at 9 kts; gusting to 14 kts. Wind gusts were variable from 240 to 330 degrees.

Several other witnesses, who were in vehicles on roadways near the airport, reported that they saw the airplane flying low. It then entered a steep left bank and then nose-dived toward the ground into the trees.

There were no reported distress calls from the pilot during the flight and the pilot had normal

communications with Air Traffic Control and ground personnel throughout the flight.

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	33,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Helicopter; Instrument airplane; Instrument helicopter	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	May 9, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 1, 2015
Flight Time:	2075 hours (Total, all aircraft), 200 hours (Total, this make and model), 100 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

The pilot, age 33, held an airline transport pilot certificate with an airplane single-engine and multi-engine land, instrument airplane rating, and rotorcraft helicopter and instrument helicopter rating. Additionally, the pilot held a flight instructor certificate with ratings in single and multi-engine land, instrument airplanes and helicopters. According to the pilot's logbook, the pilot had recorded 2,075 total flying hours and 100 flying hours in the 90 days preceding the accident. Additionally, he recorded having 200 hours in the accident airplane and 80 hours in the accident airplane within the preceding 90 days. The pilot had successfully completed an instrument proficiency check flight on October 1, 2015.

The pilot held a valid first-class medical certificate dated May 9, 2015. The certificate showed no restrictions or limitations.

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N1703
Model/Series:	SR22T NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2014	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	0806
Landing Gear Type:	Tricycle	**Seats:**	5
Date/Type of Last Inspection:	December 14, 2015 Continuous airworthiness	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1198.1 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed	**Engine Model/Series:**	TSIO-550-K1B
Registered Owner:	On file	**Rated Power:**	315 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was a Cirrus SR-22T. The five-place, low wing, single-engine airplane, serial number 0806, was manufactured in 2014, and had a standard airworthiness certificate classifying its operation in the normal category, dated June 23, 2014.

The airplane was powered by one Continental Motors, Incorporated TSIO-550-K1B fuel-injected and turbocharged 6-cylinder horizontally opposed reciprocating engine, serial number 1010320, rated at 315 horsepower at 2,600 rpm.

The airplane was equipped with a 3-blade Hartzell model PHC-J3Y1F-1RF constant-speed propeller, serial number NJ932B. The propeller was installed on June 2, 2014 at zero time.

According to the airplane's airframe logbook, the airplane underwent an annual inspection on September 18, 2015. The recorded tachometer and Hobbs times at the annual were 874.0 hours. A 50-hour inspection was performed on December 14, 2015. The airframe time at the 50-hour inspection was 1,198.1 hours. No other logbook entries followed. According to the engine logbook, a 50-hour inspection was performed on the engine in accordance with the Cirrus service manual and inspection checklist. The oil and filter were changed and engine operational and leak tests were performed satisfactorily. On January 19, 2016, an overhauled fuel pump was installed on the engine and the engine was ground run and checked satisfactory. No other logbook entries followed.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	I19,949 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	18:02 Local	**Direction from Accident Site:**	250°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 1700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / 14 knots	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.02 inches Hg	**Temperature/Dew Point:**	-2°C / -4°C
Precipitation and Obscuration:			
Departure Point:	Indianapolis, IN (TYQ)	**Type of Flight Plan Filed:**	IFR
Destination:	Xenia, OH (I19)	**Type of Clearance:**	IFR
Departure Time:	17:00 Local	**Type of Airspace:**	Class G

At 1732, the routine aviation weather report for I19 was wind 300 at 6 kts, ceiling 1,800 ft overcast, 10 statute miles visibility, temperature 0 degrees Celsius (C), dew point -02 degrees C, and altimeter 30.13 inches Hg.

At 1658, the routine aviation weather report for Wright Paterson Air Force Base (FFO), Dayton, Ohio, 343-degrees at 9 nm from I19, was wind 240 degrees at 9 kts, ceiling 200 ft overcast, visibility 10 statute miles, temperature 01 degree Celsius (C), dew point -03 degrees C, altimeter 30.10 inches Hg, and remarks variable ceiling height 170 ft. to 220 ft.

At 1753, the routine aviation weather report for FFO was wind 250 at 11 kts, gusting to 17 kts, ceiling 190 ft overcast, visibility 10 statute miles, temperature 0 degrees Celsius (C), dew point -04 degrees C, altimeter 30.12 inches Hg, and remarks sea level pressure 207 hPa.

The upper air balloon sounding from Wilmington, Ohio, 165 degrees at 18 miles from I19, taken at 1900 showed high icing potential within the cloud layers above the surface. The upper air balloon was released into air that was drier above 5,000 ft mean seal level (msl). However, the infrared satellite imagery from 1730 to 1815 showed cloud top temperatures of -12 C, which corresponded to cloud tops around 12,000 ft indicating the likelihood of moderate or greater icing along the airplane's route of flight until 1752 when the airplane descended below the cloud ceiling. However, with the surface temperature at freezing and no warm layer above that, any ice built up on the airplane would not have melted before reaching the ground.

The weather radar imagery showed no precipitation falling from aloft to the surface so cloud droplets remained in the air and in the clouds

The area forecast issued at 1345 and valid for the accident time called for broken ceilings at 3,000 ft msl with cloud tops as 12,000 ft msl and visibilities of 3 to 5 miles in freezing mist.

There were Airmen's Meteorological Information (AIRMETs) issued at 1545 for instrument conditions, ceiling below 1,000 ft and/or visibilities below 3 miles in precipitation and/or mist, and for moderate icing conditions below 12,000 ft. The Center Weather Service Unit in Indianapolis Center issued a meteorological impact statement warning of occasional moderate rime and mixed icing between 2,000 and 5,000 ft msl.

Pilot reports received two hours prior to the accident and 1 hour after the accident showed for the area around I19, light and moderate rime to moderate mixed icing in the clouds below flight level 200.

A query of Lockheed Martin Flight Service and DUATS indicated the pilot did not contact either for weather or Notices to Airmen (NOTAMs).

Airport Information

Airport:	Lewis A Jackson Regional I19	**Runway Surface Type:**	Asphalt
Airport Elevation:	949 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:	25	**IFR Approach:**	Circling;RNAV;Visual
Runway Length/Width:	4500 ft / 75 ft	**VFR Approach/Landing:**	Traffic pattern

The Greene County - Lewis A. Jackson Regional Airport, FAA identifier I19, was located 10 miles east of Dayton, Ohio. The published field elevation was 949 ft msl. Its runway was 7-25, which was 4,500 ft. long and 75 ft. wide, and had an asphalt surface. The airport was publically owned by the Green County Regional Airport Authority and operated on a Common Traffic Advisory Frequency (CTAF) of 122.7 MHz. Both runways featured PAPI visual slope indicators and runway end identifier lights. The airport had RNAV (GPS) and VOR approaches to both runways.

The RNAV (GPS) approach to Runway 7 began at the UYOKO waypoint, which was the published initial fix. A 5 nm holding pattern at or above 2,700 ft was collocated with the waypoint. The final approach course was 068-degrees. On crossing UYOKO, pilots established themselves on the 068-degree course and remained at or above 2,700 ft until reaching the final approach fix, the WANKU waypoint, which after crossing; pilots could descend to at or above 1,820 ft until crossing the NINRE waypoint, located 2.7 nm from the end of the runway. On crossing NINRE, pilots could continue their descent to the published minimum descent altitude of 1,320 ft, if the airplane is I-NAV equipped, which is 384 ft above the runway elevation. The weather minimums to fly the straight-in approach were 400 ft ceiling and 1 mile visibility.

To fly the circling approach to land on Runway 25, on crossing NINRE, pilots could descend to 1,460 ft, which was 514 ft above the runway elevation. The weather minimums to fly the circling approach were a 600 ft ceiling and 1 mile visibility.

The published missed approach procedure required that pilots initiated a climb to 2,700 ft, fly the runway heading of 069 degrees, and proceed to the TUNNU waypoint.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.690834,-83.991943(est)

The airplane wreckage was found in a lightly wooded ravine about 300 ft short of the runway 25 threshold, approximately on bearing with the runway. The airplane impacted in a nose down vertical attitude. Trees and brush immediately adjacent to the wreckage showed little damage.

The airplane was oriented on a 284-degree magnetic heading and was located at 39.693888 degrees North longitude, and -83.983611 West latitude, at an elevation of 932 ft msl. The entire airplane was confirmed to be in the in the vicinity of the initial ground impact.

The ground underneath the airplane's engine was pushed outward and up, consistent with it being the initial point of impact. The engine was twisted to the left and resting on its left side. The propeller hub was separated from the crankshaft aft of the propeller mounting flange and lay uphill from the airplane. The crankshaft at the fracture showed a torsional, shear separation consistent with the crankshaft turning at high speed at the time of the fracture. Two of the composite propeller blades were found on the ground between the airplane and the propeller hub. Both of the blades showed leading edge gouges and dents. The blade that remained with the propeller hub showed minimal damage. The airplane's cowling was broken out and found resting forward of the airplane wreckage. The nose landing gear strut was fractured in multiple locations and was located on the ground immediately adjacent to the bottom of the engine.

The airplane was equipped with the Cirrus Airframe Parachute System (CAPS), a Ballistic Recovery System (BRS). Evidence at the accident site showed that the CAPS system was not activated in flight. The charge cartridge for the parachute deployment mechanism was found expended, due to impact forces.

The fuselage remained predominantly intact. The cabin floor structure and bottom of the fuselage showed upward crushing from the firewall aft to the fuselage station 306 bulkhead. The wing and spar cover were separated. The cabin roof was intact, however first responders had cut the A and B-pillars and laid the cabin roof to the side of the airplane to facilitate the recovery of the pilot. It remained attached to the fuselage by the CAPS activation cable and other wires. The left cabin door broken out from the fuselage and was crushed and fractured. The right cabin door remained attached to the detached cabin roof section by its upper hinge and showed crush damage. The baggage door was separated from the fuselage and showed crush damage.

The firewall was crushed aft displacing the rudder pedal wells and twisted the cockpit center console. The windscreen and all of the cabin windows were broken out. Pieces of Plexiglas were located around the airplane in all directions.

The instrument panel was broken downward and aft. However, most of the components, instruments and switched remained intact. The BAT 1&2, ALT 1&2, avionics, and pitot heat switches were found in the ON position. All other bolster switches were in the OFF position. The panel dimmer knob was at the 7 o'clock position, the windshield dimmer knob was broken off. The flap switch was in the UP position. The fuel selector was set to the right tank. The oxygen switch was in the OFF position and all of the oxygen cannulas were stored in their storage bag, which was found on the ground near the airplane. The fan selector was set to zero and the hot/cold selector knob was set to full hot. The standby altimeter was set to 30.09 and displayed an altitude of 1,040 ft.

All four seats showed upward crushing due to impact. The pilot seat was positioned forward of the seat stop. The energy absorption module in the pilot seat was crushed approximately 2-3 inches in the center while the four corners remained higher. Both airbag seatbelts had deployed. The pilot airbag vent holes were both squared and the airbag showed a 2-inch cut.

A ground scar was present immediately forward of the right wing that spanned the entire length of the right wing. Dirt was found pushed upward on the underside of the right wing just aft of the leading edge consistent with the wing impacting the terrain at that location.

The wing right remained attached to the fuselage and exhibited impact damage. Dirt adhered to the upper wing surfaces in such a manner that it was evident that the wing skin had been coated with TKS (ice protection) fluid during flight. The outboard section of the right side of the wing was broken at a 90-degree angle to the inboard portion of the wing and was resting on its wingtip. The fractured end was supported by the right main landing gear attached to the inboard wing section. The right aileron remained attached to the wing and exhibited upward crushing and buckling. The right flap remained attached to the wing by its inboard hinge point and showed upward crushing and buckling.

The left wing was lying flat on the ground and exhibited upward crushing and bucking. The left main landing gear was broken aft, but remained attached to the underside of the wing. The left aileron remained attached to the wing at its hinges and showed upward crushing and buckling. The left flap remained attached to the wing and showed upward crushing. An examination of the roll trim motor at the left flap showed the roll trim to be in a position between neutral and full left trim, but favoring neutral.

A visual inspection of the aileron cables showed no anomalies with routing through the fairleads in the wing or aileron actuation pulleys in the wing. Cable routing at the forward pulley also showed no anomalies. Both flaps visually were shown to be retracted.

Both wing fuel tanks were breached but contained undetermined amounts of fuel. Both fuel caps were present and secure in their receptacles.

The empennage remained attached to the fuselage and showed upward crushing from impact. The horizontal stabilizer was partially debonded from the empennage and showed upward crushing. Both elevators remained attached to the horizontal stabilizer. The pitch trim motor examined and the pitch trim was determined to be approximately neutral.

The vertical stabilizer remained attached to the empennage and showed bending and crushing from

impact. The rudder remained attached to the vertical stabilizer by the lower hinge point and push-pull tube. The rudder exhibited bending and crushing from impact. Control continuity to the elevator and rudder were confirmed.

The airplane's engine was retained for further examination at Continental Motors, Mobile, Alabama. The airplane's Remote Data Module (RDM) was sent to the National Transportation Safety Board's Vehicle Recorders Laboratory, Washington, DC, for download and readout.

Medical and Pathological Information

The results of an autopsy performed on the pilot on January 27, 2016, by the Montgomery County, Ohio, Coroner, Dayton, Ohio, showed the cause of death to be from acute ventricular dysrhythmia and multiple blunt force trauma sustained in an airplane crash.

The FAA's Civil Aerospace Medical Institute performed forensic toxicology on specimens from the pilot. The results were negative for all tests conducted.

Tests and Research

The airplane's Remote Data Module (RDM) was sent to the NTSB Vehicle Recorder's laboratory, Washington, DC, for download and readout. Tabular data and graphic depictions of the airplane's systems and performance indicated the airplane's engine and systems performed normally up to the time of the accident. Some highlights drawn from the data included:

The CAPS system showed ARMED throughout the flight.

The RDM data showed the position of the anti-ice tank switch. From the graphic depiction, the system was turned on about 7 minutes and 30 seconds prior to the accident for 1 minute and 50 seconds. It was then turned off and remained off for the remaining 5 minutes and 40 seconds to the accident.

The airplane's flaps were positioned to HALF, 2 minutes and 50 seconds before the accident.

Just before the data and graphs end, the airplane's pitch and bank increased and the stall warning activated. In the last three seconds of the data, the airplane's bank angle was 48 to 50 degrees. Indicated airspeed showed between 87 and 90 kts, and vertical speed increased from a 240 ft per minute descent to 1,056 ft per minute.

The airplane's engine was disassembled and examined at Continental Motors, Incorporated, Mobile, Alabama, on June 24, 2016. The examination showed no anomalies that would have resulted in the engine not producing full power when needed.

A review of the Pilot's Operating Handbook showed that at 60 degrees of bank with half flaps, the airplane's stall speed is 95 kts.

Administrative Information

Investigator In Charge (IIC):	Bowling, David
Additional Participating Persons:	Gary Middleton; Federal Aviation Administration; Cincinnati, OH Brad T Miller; Cirrus Aircraft; Duluth, MN Kurt Gibson; Continental Motors; Mobile, AL
Original Publish Date:	November 17, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=92666