



Aviation Investigation Final Report

Location:	Chesterfield, Missouri	Accident Number:	CEN13FA456
Date & Time:	August 3, 2013, 04:56 Local	Registration:	N225CD
Aircraft:	CIRRUS DESIGN CORP SR22	Aircraft Damage:	Destroyed
Defining Event:	Low altitude operation/event	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The instrument-rated pilot departed with a reported cloud ceiling of 400 feet above ground level and 3 miles visibility. A witness, who was about 0.3 nautical mile (nm) west of the departure end of the runway, observed seeing the accident airplane's navigation lights for about 3 to 5 seconds as it traveled west. The airplane appeared to be traveling at a high rate of speed and in a descent. He saw a fireball as the accident airplane impacted the trees and terrain. He reported that the weather conditions were "very foggy" and that he could only see the accident airplane's navigation lights due to the fog and dark light conditions. Approach control radar data indicated that the airplane did not climb more than 200 feet above ground level before impacting the trees. The examination of the wreckage debris field indicated that the airplane was in a shallow descent at impact. The postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

Probable Cause and Findings

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

The pilot's failure to establish and maintain a positive climb rate during the initial climb in night instrument meteorological conditions.

Findings

Aircraft	Climb rate - Not attained/maintained
Environmental issues	Low ceiling - Contributed to outcome
Environmental issues	Fog - Contributed to outcome
Environmental issues	Dark - Contributed to outcome
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Initial climb	Low altitude operation/event (Defining event)
Initial climb	Controlled flight into terr/obj (CFIT)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On August 3, 2013, at 0456 central daylight time, a Cirrus SR22, N225CD, was destroyed when it impacted trees and terrain about 0.6 nautical miles (nm) west of the Spirit of St. Louis Airport (SUS), Chesterfield, Missouri. The wreckage was fragmented and a post impact ground fire consumed a majority of the airplane. The airplane was departing from SUS and was en route to the Dalhart Municipal Airport (DHT), Dalhart, Texas. The private pilot and one passenger received fatal injuries. The airplane was registered to 225CD LLC and operated by the pilot under the provisions of the 14 Code of Federal Regulations as a Part 91 personal flight. Night instrument meteorological conditions (IMC) prevailed at the time of the accident, and an instrument flight plan was filed.

At 0321, the pilot contacted the Fort Worth Automated Flight Service Station (FSS) to receive a standard weather briefing. The FSS briefer provided information about the instrument flight rules (IFR) conditions that prevailed at SUS and would be in effect for much of the morning. IFR and low IFR conditions prevailed throughout central Missouri and Kansas. The pilot decided to file an IFR flight plan that would proceed from SUS to St. Joseph, Missouri, and then proceed to the southwest to land at DHT for fuel. Visual meteorological conditions prevailed between DHT and the pilot's final destination, the Winslow-Lindbergh Regional Airport (INW), Winslow, Arizona.

At 0451, the pilot contacted the St. Louis Terminal Radar Approach Control Facility (TRACON) to obtain a departure clearance, since the control tower at SUS was not open. The pilot was cleared to DHT as filed in his flight plan. He was cleared to climb to 3,000 feet above mean sea level (msl), and to expect 10,000 feet msl 10 minutes after departure. At 0452, the TRACON controller told the pilot he was released for departure, and when able, to proceed on course. He requested that the pilot call him if his departure was delayed more than five minutes. The pilot responded, "Will call you back if, ah, more than five minutes, Five Charlie Delta. Cleared for departure." There were no further communications from the pilot.

Approach control radar data indicated that the airplane became airborne about 0456. The first four radar returns indicated that the airplane climbed to 600 feet msl +/- 50 feet. The fifth radar return indicated the airplane was at 500 feet msl +/- 50 feet. The last radar return was about 0.3 nm from the departure end of runway 26R. The elevation at SUS is 463 feet.

A witness reported that he was driving south on N. Eatherton Road, which runs perpendicular to runway 26R about 0.3 nm west of the departure end of runway 26R, and observed seeing the accident airplane's navigation lights for about 3 to 5 seconds as it traveled to the west. The airplane appeared to be traveling at a high rate of speed and in about a 20 degree descent. He saw a fireball as the accident airplane impacted the trees and terrain. He reported that the weather conditions were "very foggy," and it was the

worst fog conditions that he had observed for the year. He reported that he could only see the accident airplane's navigation lights due to the fog and light conditions.

Pilot Information

Certificate:	Private	Age:	41
Airplane Rating(s):	Single-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:	November 23, 2009
Occupational Pilot:	No	Last Flight Review or Equivalent:	February 14, 2013
Flight Time:	475 hours (Total, all aircraft), 154 hours (Total, this make and model), 38 hours (Last 90 days, all aircraft), 24 hours (Last 30 days, all aircraft)		

The 41-year-old private pilot held a single-engine land and airplane instrument ratings. He received his airplane instrument rating on February 14, 2013, and he used the accident airplane for his instrument training and instrument check ride. He held a third class medical certificate. The pilot's logbook was not retrieved; however, aircraft flight logs and insurance records indicated that the pilot had about 475 total flight hours with about 154 hours in accident airplane. He flew about 24 hours within the last 30 days. The pilot's total number of instrument hours flown is unknown. He pilot purchased a 1/3 ownership in the accident airplane about 1.5 years before the accident.

The pilot's instrument instructor reported that he provided about 20 hours of training in preparation for the pilot's instrument rating. He stated the accident pilot was quick to engage the autopilot and was overly trusting of the autopilot system at the beginning of their training. He worked with the pilot to hand fly the airplane to increase his skill level in instrument conditions. He never flew with the accident pilot in actual IMC, but they flew several flights at night.

The designated pilot examiner who gave the instrument check ride to the pilot reported that the pilot failed his first check ride in January 2013. The pilot reportedly had deviated off course while on an instrument landing system (ILS) and GPS instrument approaches during the first check ride attempt. He stated that the accident pilot met all the standards of the practical test during the second check ride, and was issued his instrument rating in February 2013.

The pilot's wife reported that he had been on vacation since Wednesday, July 31, 2013. He had normal sleep cycles on account that he did not have to go to work. The pilot did not have any sleep deprivation problems, was healthy, and typically exercised every day. He loaded the airplane on Friday night in order to get an early departure on Saturday morning. The pilot's wife was uncertain how much sleep he had on Friday night.

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	Registration:	N225CD
Model/Series:	SR22	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	0031
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	September 11, 2012 Annual	Certified Max Gross Wt.:	3400 lbs
Time Since Last Inspection:	277 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	2077 Hrs at time of accident	Engine Manufacturer:	CONT MOTOR
ELT:	Installed, not activated	Engine Model/Series:	IO-550-N
Registered Owner:	225CD LLC	Rated Power:	310 Horsepower
Operator:	Shiv Patil	Operating Certificate(s) Held:	None

The airplane was a single-engine Cirrus SR22, serial number 0031. The engine was a Continental 310-horsepower IO-550N engine. The airplane seated four and had a maximum gross weight of 3,400 pounds. The last annual maintenance inspection was conducted on September 11, 2012, with a total time of 1800.8 hours on the airframe and engine. The last oil change was completed on July 21, 2013, with an engine time of 2,067.4 hours. An engine oil analysis indicated normal values at the last inspection.

On July 18, 2013, an Avidyne EX5000 Multifunction Display (MFD), part number 700-00004-006, serial number 2055, was installed on the airplane. The original ARNAV MFD was providing erroneous information and required replacement. The total airframe time was 2,058.1 hours.

On July 31, 2013, the pilot altimeter, static pressure system, transponder, and altitude encoder were tested and certified. The total airframe time at the time of the inspection was 2,074.8 hours.

One of the partners who owned the airplane reported that he flew the airplane to Joplin, Missouri, and back to SUS on the day before the accident. He encountered some IMC conditions during the flight and used the autopilot for the entire flight, except for the takeoffs and landings. He stated that all the instruments were working properly for the flight, and for the 4 to 5 flights he had flown during the last 10 days. He stated that he had flown the airplane a dozen times since the MFD was replaced and it operated properly during those flights.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Night/dark
Observation Facility, Elevation:	SUS,463 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	04:54 Local	Direction from Accident Site:	70°
Lowest Cloud Condition:		Visibility	3 miles
Lowest Ceiling:	Overcast / 400 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	10°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.95 inches Hg	Temperature/Dew Point:	22°C / 21°C
Precipitation and Obscuration:	N/A - None - Mist		
Departure Point:	Chesterfield, MO (SUS)	Type of Flight Plan Filed:	IFR
Destination:	Delhart, TX (DHT)	Type of Clearance:	IFR
Departure Time:	05:10 Local	Type of Airspace:	

The SUS weather surface observation at 0454 was: wind 010 at 4 knots; visibility 3 miles in mist; overcast ceiling at 400 feet above ground level (agl), temperature 22 degrees Celsius (C); dew point 21 degrees C; altimeter 29.95.

The SUS special weather surface observation at 0512 was: wind 020 at 7 knots; visibility 1 3/4 miles in mist; overcast ceiling at 400 feet agl, temperature 22 degrees C; dew point 21 degrees C; altimeter 29.95; ceilings variable from 200 to 600 feet.

Airport Information

Airport:	Spirit of St. Louis Airport SUS	Runway Surface Type:	Asphalt
Airport Elevation:	463 ft msl	Runway Surface Condition:	Dry
Runway Used:	26R	IFR Approach:	None
Runway Length/Width:	5000 ft / 75 ft	VFR Approach/Landing:	None

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:	On-ground
Total Injuries:	2 Fatal	Latitude, Longitude:	38.660556,-90.681663(est)

The examination of the accident site revealed that the accident airplane impacted the woods located west of SUS on a 250 degree magnetic heading from the departure end of runway 26R. The wreckage path was about 350 feet in length, also on about a 250 degree magnetic heading, from where the initial impact occurred at the edge of the woods to the nose landing gear, which was the part of the accident airplane found furthest from the initial impact point.

A piece of the right wingtip was observed embedded in the trunk of a 70 to 80 foot tall tree located near the edge of the woods. The piece was embedded about 30 feet up from the base of the tree. Another tree about 96 feet from the initial impact point also was struck. The tree was about 32 inches in diameter at the base of the tree. The impact occurred near the tree's mid-span and the impact toppled the top of the tree in the direction of travel. A piece of the tree trunk was found at the base of the tree that had a 13 inch by 18 inch diagonal slash with gray paint transfer, which was consistent with a propeller slash mark. The left wing and the wing spar were located about 150 feet from the initial impact point and had extensive fire damage. The aft cabin and cargo compartment were found near the left wing. The Cirrus Aircraft Parachute System (CAPS) rocket motor had fired. The parachute was found deployed, although the parachute canopy had not opened and was found in a packed condition and still in the deployment bag. The airplane's empennage was found about 200 feet from the initial impact point. The elevator and rudder control cables remained attached to the control surfaces and exhibited continuity. The aileron cables to the left wing remained attached to the left aileron actuation pulley, and the left wing aileron control cable continuity was confirmed. The right wing received extensive damage and control cable continuity to the right aileron could not be confirmed. The flap actuator was found in the flaps up position. The instrument panel and avionics were separated from the cockpit and located at various locations in the debris field. The pilot-side attitude gyro remained attached to the instrument panel, but the other instruments were dislodged from the panel. The pilot-side attitude gyro displayed about a 4 degrees nose down with a 3 degrees right wing down attitude.

The on-site examination of the engine revealed that the crankcase had impact damage and the forward top portion of the crankcase was found separated in the debris field. The crankshaft was fractured in the area of the nose seal, and the crankshaft propeller flange separated with the propeller hub. The fracture features were consistent with the application of combined torsion and bending. The fracture surface of the crankshaft exhibited 45-degree cracks to both the internal and external surfaces, which were consistent with torsional loading. The cylinders exhibited impact and thermal damage. The cylinders were examined with a lighted borescope. The combustion chambers were a light color. The top and bottom spark plugs exhibited "worn out-normal" operating signatures when compared to a manufacturer's wear diagram.

The three-bladed, variable-pitch propeller had separated from the engine and exhibited impact damage.

The propeller blade marked "A" was loose in the hub and had multiple bends. Mid-span of blade A leading edge nicks and gouges were observed as well as chord wise scratches to the chambered face. Blade B was bent forward at mid-span. Blade C exhibited a gradual bend aft from the hub to the tip.

The airplane's directional gyro and horizon reference indicator were sent to the National Transportation Safety Board's (NTSB) Materials laboratory for examination. A Go-Pro video camera, a Drift Innovation video camera, and the accident airplane's MFD's memory card were sent the NTSB Vehicle Recorder's laboratory for examination.

Medical and Pathological Information

An autopsy of the pilot was performed at Saint Louis County Health in St. Louis, Missouri, on August 4, 2013. The "Cause of Death" was listed as craniocerebral blunt trauma. A Forensic Toxicology Fatal Accident Report was prepared by the FAA Civil Aerospace Medical Institute. No carbon monoxide was detected in the blood (cavity). The test for cyanide was not performed. The following substances were identified in the toxicology report: 39 mg/dL ethanol detected in blood (cavity), 38 mg/dL ethanol detected in muscle, 38 mg/dL ethanol detected in kidney, ephedrine detected in liver, ephedrine detected in blood (cavity), pseudoephedrine detected in liver, pseudoephedrine detected in blood (cavity), trimethoprim detected in liver, and trimethoprim detected in blood (cavity).

Pseudoephedrine is used to relieve nasal congestion caused by colds, allergies, and hay fever. It is also used to temporarily relieve sinus congestion and pressure. Trimethoprim may be used for cold symptoms as well. The ethanol levels found in this case were consistent with putrefaction, since the recovery of the body was delayed.

Tests and Research

The NTSB Vehicle Recorders laboratory examined the MFD memory card. The examination revealed that the memory chip was cracked and no data was recovered. The examination of the GoPro Hero 3 and the Drift HD camera/recorder memory cards revealed that the files contained on the memory cards were not pertinent to the accident flight.

The NTSB Materials laboratory disassembled the gyro assembly of the directional gyro to look for indications of rotation on the gyro housing and rotor. The examination of the inner surface of the housing revealed circumferentially oriented scratches where the housing material had been exposed. The surface of the rotor exhibited circumferentially oriented areas where the surface finish had been disturbed to reveal the underlying metal.

The NTSB Materials laboratory examination of the horizon reference indicator (attitude gyro) revealed that the interior surface of the gyro assembly had dark, circumferentially oriented marks and circumferentially oriented scratches where the housing materials had been exposed. The gyro's rotor also

had circumferentially oriented marks on its surface.

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	Larry Sadowski; FAA St. Louis FSDO; St. Anne, MO Brannon Mayer; Cirrus Aircraft; Duluth, MN Chris Lang; Continental Motors; Mobile, AL
Original Publish Date:	May 22, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=87653

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