Aviation Investigation Final Report

Location:	Columbus, Ohio	**Accident Number:**	CEN11FA401
Date & Time:	June 19, 2011, 08:42 Local	**Registration:**	N526PG
Aircraft:	CIRRUS DESIGN CORP SR22	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

After takeoff in instrument meteorological conditions, the airplane was cleared for a left turn. Shortly thereafter, the airplane entered a left climbing turn, and the pilot engaged the autopilot. The flight director subsequently commanded a right roll and a decrease in pitch attitude. (The GPS steering command was set to navigate to a waypoint, and the shortest way to get there was a turn to the right.) The airspeed decreased to 105 knots and the bank angle was over 45 degrees left-wing low, so the aural underspeed alert activated because of the risk of stall. The nose-up pitch attitude decreased through level flight and entered a nose-down attitude; the left bank angle continued to increase. The underspeed alert ceased when the airplane reached an airspeed of 141 knots; the airplane was at a maximum left bank angle of 72 degrees and a maximum nose-down attitude of 24 degrees. Recorded data showed the engine was producing power throughout the flight and the autopilot was operating normally. An examination of the engine and airplane revealed no evidence of mechanical malfunctions or failures that would have precluded normal operations. Given that the autopilot was set such that it would command a right turn when engaged, yet the pilot was instructed by the air traffic controller to turn left, it is likely that the pilot was overpowering the autopilot system to comply with the instructions. According to the airplane manufacturer, it would only take 17 pounds of force to override the autopilot in pitch and 3 to 5 pounds to override the roll. Further, given the instrument conditions that were present at the time, it is likely that the pilot experience spatial disorientation and did not recognize the effects of his inputs.

oxicological results indicated the pilot had taken a sedating medication at some point before the accident; however, the levels were such that a determination of the level of impairment was not possible.

Probable Cause and Findings

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

The pilot's spatial disorientation during the takeoff into instrument meteorological conditions, which resulted in his failure to maintain control of the airplane.

Findings

Personnel issues	Spatial disorientation - Pilot
Personnel issues	Aircraft control - Pilot
Environmental issues	Low ceiling - Effect on personnel

Factual Information

History of Flight

Takeoff	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On June 19, 2011, at 0842 eastern daylight time, a Cirrus Design Corporation, SR-22, N526PG, collided with the terrain following a loss of control shortly after takeoff from the Rickenbacker International Airport (LCK), Columbus, Ohio. The private instrument rated pilot and passenger were fatally injured. The personal flight was operating under 14 Code of Federal Regulations Part 91. Instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed. The airplane departed LCK at 0840. The planned destination for the flight was the Essex County Airport (CDW), Caldwell, New Jersey.

The pilot contacted ground control and received his IFR clearance in which he was cleared to CDW as filed and to climb to an initial altitude 3,000 feet after departure. The first fix listed on the flight plan was the Appleton (APE) very high frequency omnidirectional range (VOR).

The local controller then cleared the airplane or an intersection takeoff on Runway 23R at taxiway Echo and a left turn after takeoff. Taxiway Echo is approximately 8,525 feet from the departure end of the runway. The controller stated he watched the airplane takeoff and begin a left turn into the clouds. The controller then instructed the pilot to contact departure control. The controller stated he did not receive a response from the pilot. He then noticed smoke on the southwest side of the airport.

A line person who fueled the airplane and a fireman who worked at the airport both reported that the airplane engine sounded normal prior to the accident. The fireman reported seeing the airplane descend and impact the terrain. He reported the impact angle was about 10 degrees.

Pilot Information

Certificate:	Private	**Age:**	54
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	October 15, 2010
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	January 17, 2011
Flight Time:	509 hours (Total, all aircraft), 236 hours (Total, this make and model), 377 hours (Pilot In Command, all aircraft), 57 hours (Last 90 days, all aircraft), 13 hours (Last 30 days, all aircraft)		

The pilot, age 54, held a held a private pilot certificate with an instrument rating. The pilot received his instrument rating on May 16, 2010. The pilot was issued a third-class medical certificate dated October 15, 2010. The medical certificate contained the limitation that the pilot must have glasses available for near vision.

The pilot's logbook contained entries from when the pilot began flight training on August 27, 2005, through May 27, 2011. In addition, a small red notebook was found in the wreckage in which the pilot was logging flights beginning on October 20, 2010. This book contained four entries from May 29, 2011, and up to the accident flight. According to these records, the pilot had a total of 509 hours of flight time, of which 236 hours were in Cirrus SR-22 airplanes.

The pilot received his instrument rating on May 16, 2010. According to the pilot's logbook, he completed an instrument proficiency check on January 17, 2011. A logbook entry dated April 10, 2011, recorded 5.4 hours of dual flight time with the remark, "IFR Review." The logbook showed the pilot had logged about 23 hours of actual instrument flight time and 53 hours of simulated instrument flight time.

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N526PG
Model/Series:	SR22	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2963
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	March 18, 2011 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	43 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	483 Hrs	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-550-N
Registered Owner:	Buds Aviation LLC	**Rated Power:**	310 Horsepower
Operator:	Buds Aviation LLC	**Operating Certificate(s) Held:**	None

The low-wing airplane, serial number 2963, was manufactured in 2008. The airplane was powered by a Continental IO-550-N (46) engine. The pilot purchased the airplane in October 2010. The aircraft total time, just prior to the accident flight, was recorded by the pilot as being 482.5 hours, with a hobbs time of 570.4 hours.

According to the airframe logbook, the last annual inspection on the airplane was completed on March 18, 2011. The aircraft total time at this inspection was listed as being 439.1 hours with a hobbs time of 515.6 hours.

According to the engine logbook, the last annual inspection on the engine was completed on March 18,

2011. The engine total time was listed as 439.1 hours with a hobbs time of 515.6 hours.

Maintenance records indicate that an Avidyne DFC90 Autopilot system was installed in the airplane on January 14, 2011.

The airplane was filled with 48 gallons of 100LL fuel prior to the accident takeoff.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	LCK,744 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	08:41 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:		**Visibility**	5 miles
Lowest Ceiling:	Broken / 500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.86 inches Hg	**Temperature/Dew Point:**	22°C / 19°C
Precipitation and Obscuration:	N/A - None - Haze		
Departure Point:	Columbus, OH (LCK)	**Type of Flight Plan Filed:**	IFR
Destination:	Caldwell, NJ	**Type of Clearance:**	IFR
Departure Time:	08:40 Local	**Type of Airspace:**	Class D

A review of the recorded surface observation weather data from LCK, revealed the conditions at 0841 were wind from 190 degrees at 6 knots; visibility 5 miles with haze; ceiling 500 feet broken; temperature 22 degrees Celsius; dewpoint 19 degree Celsius; and altimeter setting 29.86 inches of mercury.

Airport Information

Airport:	Rickenbacker Int'l Airport LCK	**Runway Surface Type:**	Asphalt
Airport Elevation:	744 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	23R	**IFR Approach:**	None
Runway Length/Width:	11902 ft / 150 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:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	38.799999,-82.917778

The airplane impacted a harvested field on the south side of the airport property outside the airport perimeter fence. The wreckage path was approximately 402 feet long on a path heading of 082 degrees. The airplane sustained postimpact fire damage.

The pitot tube and pieces of fiberglass consistent with the left wingtip were located near the main impact area. The main impact area was approximately 36 feet long and it contained portions of the nose landing gear, engine mounts, a lower wing skin access panel, and engine mounts. The corn stubble was burned near this impact mark.

Pieces of wreckage were scattered between the initial ground impact and the main wreckage. These items included the magneto switch which was separated from the instrument panel and in the "Both" position, pieces of the left wing, portions of the landing gears, and portions of the engine cowling.

The main wreckage consisted of the majority of the fuselage, sections of both wings, the empennage, engine, and propeller. The fuselage was mostly destroyed by fire. The firewall and instrument panel structure came to rest inverted.

Following the accident, three scorched pages from a Cirrus SR-22 Pilot Operating Handbook were located inside the airport boundary fence. The binder and remaining pages were located scattered along the wreckage path. In addition, a broken coffee cup was located on the taxiway Charlie. Attempts to identify where the mug came from were unsuccessful.

Examination of the recovered airframe and flight control system components revealed no evidence of preimpact mechanical malfunction. The engine was separated from the firewall. Portions of the engine sustained impact and heat damage. The propeller spinner exhibited rotational twisting. The propeller was separated from the engine just aft of the propeller flange. All three propeller blades exhibited twisting, bending, and leading edge gouges. Examination of the engine and its components revealed no evidence of preimpact mechanical malfunction.

The primary function display (PFD), multi-function display (MFD), Recoverable Data Module (RDM) and autopilot were retained by the NTSB for further examination.

Medical and Pathological Information

An autopsy was performed on the pilot on June 20, 2011, under the direction of the Franklin County Coroner.

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The test results revealed:

0.113 (ug/ml, ug/g) Diazepam detected in blood (cavity)

0.093 (ug/ml, ug/g) Diazepam detected in liver

0.151 (ug/ml, ug/g) Nordiazepam detected in liver

0.107 (ug/ml, ug/g) Nordiazepam detected in blood (cavity)

Diazepam is a benzodiazepine derivative that has anxiolytic, sedative, muscle-relaxant, anticonvulsant and amnestic effects. It is used to treat anxiety disorders, alcohol withdrawal, and muscle spasms. The therapeutic levels range between 0.1480 ug/ml and 4.000 ug/ml.

Nordiazepam is an active metabolite of several different benzodiazepines. The therapeutic levels range between 0.1000 ug/ml and 2.000 ug/ml.

Additional Information

The airplane was equipped with an Avidyne MFD and PFD, and an Avidyne DFC-90 autopilot.

The PFD unit displays aircraft parameter data including altitude, airspeed, attitude, vertical speed, and heading. The PFD samples and stores data streams in a sequential order; when the recording limit of the PFD is reached, the oldest data is dropped and a new record is added. The PFD recording contained records of 22 power cycles and approximately 16 hours of data. The accident flight occurred during the 18^{th} power cycle which was approximately 20 minutes long. Conversion of the PFD data from raw recorded information to engineering units was performed by Avidyne.

The MFD unit is able to display the pilot checklist, terrain/map information, approach chart information, engine monitoring and performance data, and other aircraft/operational information depending on the specific configuration and options installed. The MFD generated a new data file for each power-on cycle. The oldest file is dropped and replaced by a new recording once the storage limit is reached. MFD data are sampled every six seconds, and is recorded to the memory card every minute. The MFD memory card contained 93 data files. The last file contained data from the accident flight, and was approximately 17 minutes in duration. The MFD is stored in engineering units and no conversion was required.

The Avidyne DFC-90 autopilot is a digital, attitude based system. The autopilot uses output information from the PFD to provide automatic aircraft control. The autopilot controls the aircraft in both lateral and vertical modes. The unit can also provide speed-based envelope protection and full-time envelope alerting. The autopilot contains an internal memory card on which data is recorded at three different rates depending on the type of data. The data were downloaded and provided to Avidyne for processing under the supervision of the NTSB.

The RDM records and stores 200 hours of flight information. The memory card contained 100 data files. The data from the RDM was downloaded. The data is converted automatically to engineering units during the download process. Several parameters which were not automatically converted during the download process were manually converted.

The autopilot data showed that prior to the flight the pilot performed a check of the autopilot system and set the altitude for 3,000 feet, the vertical speed for a 900 fpm climb, and a heading of 240 degrees. The autopilot was set for GPSS mode; however, the primary navigational source was the VHF1 which was tuned to the runway 5R/23L localizer at LCK. The pilot had the APE VOR set as the GPS waypoint which was consistent with the planned route of flight. According to Avidyne, with this configuration the autopilot will use the GPS steering commands to fly to the waypoint. The flaps were set at 50 percent for takeoff.

The RDM data showed the pilot began the takeoff at 0840:23. Shortly after lifting off, the pilot retracted the flaps and the airplane began a left turn. About 17 seconds after retracting the flaps, the pilot engaged the autopilot at which time the airplane was at a true airspeed (TAS) of 110 knots and a pressure altitude of 1,145 feet.

The autopilot data showed the airplane was in a 13 degree pitch up attitude and a 13 degree left bank when the pilot engaged the autopilot. The autopilot data shows that the flight director commanded a roll to the right (reduction in bank angle) and a reduction in pitch attitude. The autopilot data showed that about nine seconds after the autopilot was engaged, the aural Underspeed alert came on while the airplane had a TAS of 109 knots in a 10 degree nose up, 47 degrees left bank attitude. The airplane's pitch attitude decreased and continued through level with the airplane reaching a maximum 24 degrees nose down pitch attitude. As the nose down pitch attitude increased the flight director commanded a nose up pitch attitude reaching a maximum 12 degree pitch up command. The data shows that as the airplane reached a maximum left bank angle of 72 degrees and the flight director commanded a decrease in the roll rate. The Underspeed alert stayed on for 8 seconds and it went off when the airplane reached a TAS of 141 knots with a 24 degree nose down, 72 degree left bank attitude. Five seconds after the Underspeed alert came on, the pilot adjusted the vertical speed setting (bug) from a 900 fpm climb to a 700 fpm climb

The last autopilot data showed the airplane in a 22 degree nose down attitude in a 50 degree left bank.

According to Cirrus Aircraft representatives, about 17 pounds of force is required to override the autopilot pitch control, and 3 to 5 pounds of force is required to override the autopilot roll control.

Administrative Information

Investigator In Charge (IIC):	Sullivan, Pamela
Additional Participating Persons:	John Welsh; FAA-COL-FSDO; Columbus, , OH Brad Miller; Cirrus Aircraft; Duluth, MN Andrew Swick; Teledyne ; Mobile, AL
Original Publish Date:	February 4, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=80816