



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	West Liberty, Ohio	<b>Accident Number:</b>	CEN11FA629
<b>Date &amp; Time:</b>	September 8, 2011, 11:22 Local	<b>Registration:</b>	N159JW
<b>Aircraft:</b>	CIRRUS DESIGN CORP SR22	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation		

## Analysis

Several witnesses reported hearing a low-flying airplane. One witness stated that he heard the engine go silent three times and then rev back up twice and that he saw the airplane in about a 75-degree nose-low attitude. Another witness stated that he observed the airplane complete a 360-degree loop and then go into a "direct vertical climb, reach its pinnacle, and begin to fall tail first with a partial spin." He lost sight of the airplane behind trees. He then heard a "thud" and observed a black mushroom cloud appear above the tree line. Radar track data showed an airplane with a ground speed of 40 knots near the accident site at the time of the accident; the track was consistent with the performance of the aerobatic maneuver described by the witnesses. At the time of the accident, the sky was overcast with low clouds. The examination of the wreckage indicated that the airplane impacted the ground in about a 45-degree nose-low attitude. The examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. Toxicological reports indicate that, at the time of the accident, the pilot had recently used at least five impairing drugs: diazepam, codeine, oxycodone, hydrocodone, and marijuana. All of these drugs work synergistically to create psychomotor slowing and interfere with judgment and executive functioning. It is very likely that the pilot was impaired by drug use at the time of the accident.

## Probable Cause and Findings

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

The pilot's improper decision to fly aerobatic maneuvers at low altitude, which resulted in a loss of control and impact with terrain. Contributing to the accident was the pilot's impairment due to his recent use of multiple impairing drugs.

## Findings

<b>Personnel issues</b>	Decision making/judgment - Pilot
<b>Personnel issues</b>	Incorrect action performance - Pilot
<b>Environmental issues</b>	Low ceiling - Effect on operation
<b>Personnel issues</b>	Prescription medication - Pilot
<b>Personnel issues</b>	Illicit drug - Pilot

# Factual Information

## History of Flight

<b>Maneuvering-aerobatics</b>	Loss of control in flight (Defining event)
<b>Uncontrolled descent</b>	Collision with terr/obj (non-CFIT)

On September 8, 2011, about 1122 eastern daylight time, a Cirrus SR22, N159JW, impacted a cornfield near West Liberty, Ohio, and was destroyed by impact forces and postimpact fire. The private pilot, the sole occupant, received fatal injuries. The airplane was registered to Windsor Ltd LLC and was operated by the pilot under the provisions of the 14 Code of Federal Regulations Part 91 as a business flight. Instrument meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The flight originated from the Bellefontaine Regional Airport (EDJ), Bellefontaine, Ohio, about 1118.

Witnesses reported that the pilot intended to land at Urbana, Ohio, located about 15 nautical miles (nm) south of EDJ and pick up a passenger. They were planning to fly to Jackson, Ohio, located about 100 nm southeast of EDJ. The passenger reported that he expected to be picked up at Urbana around 1115, but the airplane never arrived.

A witness who lived about 5 miles north of West Liberty, Ohio, stated that she was in her house with the window open when she heard an airplane approaching about 1115. The airplane sounded loud like it was just above the treetops. The engine sounded fine with no missing or sputtering. She stated that the airplane was "...too low. Way, way too low."

A witness who lived across the road from where the airplane crashed reported that he heard an airplane approaching at a low altitude, but he thought initially it was a 4-wheel all-terrain vehicle. He heard the engine go silent three times, and then it revved back up twice. He saw a glimpse of the airplane through the window, and it was in a 75 degree nose low attitude. He stated that he did not recognize it as an airplane until it impacted the ground. He reported that the sky was overcast with uneven low clouds, and that the fog had cleared earlier in the morning.

A witness, who was about 3/4 of a mile northeast of the accident site, stated that he observed the airplane performing a vertical loop. He saw the airplane complete the 360 degree loop, and then he observed the airplane go into a "direct vertical climb, reach its pinnacle, and begin to fall tail first with a partial spin." He stated that there seemed to be a loss of sound from the engine sometime during the climb, but then it re-engaged as the airplane turned nose down. He lost sight of the airplane behind trees. He heard a "thud" and 15 seconds later observed a black mushroom cloud appear above the tree line.

There were no communications recordings with any Federal Aviation Administration facility.

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	51
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	September 2, 2011
<b>Flight Time:</b>	591 hours (Total, all aircraft), 399 hours (Total, this make and model)		

The 51-year-old pilot held a private pilot certificate with a single-engine land rating. He was not an instrument rated pilot. He held a third class medical certificate that was issued on August 29, 2010, with no limitations listed. The pilot's logbook indicated that he had a total of 591 flight hours, which included 399 flight hours in the accident airplane. His last flight review was conducted on September 2, 2011.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	CIRRUS DESIGN CORP	<b>Registration:</b>	N159JW
<b>Model/Series:</b>	SR22	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2004	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	1159
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	May 2, 2011 Annual	<b>Certified Max Gross Wt.:</b>	3400 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	682 Hrs as of last inspection	<b>Engine Manufacturer:</b>	CONT MOTOR
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	IO-550-N
<b>Registered Owner:</b>	WINDSOR LTD LLC	<b>Rated Power:</b>	310 Horsepower
<b>Operator:</b>	Jeffrey S. Watson	<b>Operating Certificate(s) Held:</b>	None

The airplane was a single-engine Cirrus SR22, serial number 1159, manufactured in 2006. The engine was a Continental 310-horsepower IO-550N engine, serial number 917371. The airplane seated four and had a maximum gross weight of 3,400 pounds. The airplane was certificated in the normal category and was not designed for aerobatic operations. Aerobatic maneuvers

and spins are prohibited. The last annual maintenance inspection was conducted on May 2, 2011, with a total time of 682.5 hours. The pilot's logbook indicated that the airplane was flown 3 hours since the annual inspection in May. The pilot purchased the accident airplane in 2006.

### Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	EDJ, 1122 ft msl	<b>Distance from Accident Site:</b>	6 Nautical Miles
<b>Observation Time:</b>	11:20 Local	<b>Direction from Accident Site:</b>	350°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	3 miles
<b>Lowest Ceiling:</b>	Overcast / 600 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	3 knots / None	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	360°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.9 inches Hg	<b>Temperature/Dew Point:</b>	16°C / 16°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Bellefontaine, OH (EDJ )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Jackson County, OH (I19 )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	11:16 Local	<b>Type of Airspace:</b>	

At 1120, the surface weather observation at EDJ, located about 7.3 nm north of the accident site, was: winds 360 degrees at 3 knots; visibility 3 miles; overcast ceiling at 600 feet; temperature 16 degrees Celsius (C), dew point 16 degrees C; altimeter 29.91 inches of mercury (Hg).

The airport elevation at EDJ is 1,122 feet.

The elevation at the Grimes Field Airport (I74), Urbana, Ohio, and located 15 nm south of EDJ is 1,068 feet.

### Airport Information

<b>Airport:</b>	Bellefontaine Regional Airport EDJ	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	1122 ft msl	<b>Runway Surface Condition:</b>	
<b>Runway Used:</b>		<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	On-ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	40.249584,-83.749763(est)

The accident site was located in a cornfield about one mile west of West Liberty, Ohio. The examination of the initial point-of-impact and the debris field revealed that the airplane impacted the terrain on a magnetic heading of about 110 degrees. The cut through the high corn made by the airplane's landing gear, fuselage, and wings indicated that it was in about 45 degrees nose down attitude with a 10-degree left wing low attitude at impact.

The initial ground impact crater was located about 16 feet from the first row of corn that was struck. The crater was about 8 feet long, 6 feet wide and 8 inches deep. One propeller blade and the nose landing gear leg were located near the crater. The wreckage debris field, which was 27 feet wide, extended east about 120 feet from the initial impact. The main wreckage came to rest about 90 feet from the initial point-of-impact. The fuselage was destroyed by impact forces and postimpact fire.

The wings, horizontal stabilizer, and vertical stabilizer exhibited impact and fire damage. Aileron control cable continuity was confirmed. The flap actuator shaft was found in the "Flaps-Up" position. The left and right landing gear assemblies were separated from the wings. The rudder cable continuity was confirmed from the elevator control torque tube to the rudder bellcrank at the fuselage station 306 bulkhead. The elevator cable continuity was confirmed from the elevator control torque tube to the elevator bellcrank at the fuselage station 306 bulkhead. The pitch trim motor was in about the neutral pitch trim position. Cockpit documentation was not possible due to extensive impact and fire damage.

The Cirrus Airframe Parachute System (CAPS) rocket motor was located left of the debris field about 43 feet from the initial point-of-impact. A visual examination of the rocket motor revealed that the rocket motor propellant was expended. The parachute assembly was located about 50 feet from the initial point-of-impact and outside the left side of the debris field. The packed parachute was partially separated from the "D-bag."

The engine exhibited impact and fire damage. The cylinders remained attached to the engine. The top spark plugs were removed and exhibited normal operating signatures when compared with the Champion Check-A-Plug chart. The cylinders were inspected using a lighted boroscope, and the combustion chambers exhibited light colored combustion deposits. The engine was rotated and continuity was established from the rear of the engine to the forward nose seal area of the crankshaft. Thumb compression was obtained on cylinders one, three, five, and six. Cylinders two and four had impact damage to the bottom of the cylinders and the push rod housings. The crankshaft was fractured between the propeller flange and the engine nose seal. The crankshaft fracture surface exhibited 45 degree shear lip fractures and spiral cracking.

The examination of the propeller revealed that the crankshaft propeller flange remained attached to the

propeller hub. Two of the propeller blades were fractured from the propeller hub at the base of the blades. The third propeller blade remained attached to the propeller hub. All three blades exhibited multi-directional bending, chord-wise scratching, and gouges in the leading edges.

The Avidyne Primary Flight Display (PFD) and the Avidyne Multi-Function Display (MFD) installed in the accident airplane received extensive heat and impact damage. Two surface mounted flash memory chips recovered from the PFD, and the memory card recovered from the MFD were sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division for examination.

## Medical and Pathological Information

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An autopsy of the pilot was performed at the Montgomery County Coroner's Office in Dayton, Ohio, on September 9, 2011. The "Cause of Death" was listed as multiple blunt force injuries. A Forensic Toxicology Fatal Accident Report was prepared by the FAA Civil Aerospace Medical Institute. The results were negative for carbon monoxide, cyanide, and ethanol. The following substances were identified in the toxicology report: 19.73 (ug/ml, ug/g) Acetaminophen detected in blood (cavity); codeine not detected in blood (cavity); 0.161 (ug/ml, ug/g) codeine detected in liver.; 0.152 (ug/ml, ug/g) diazepam detected in blood (cavity); 0.458 (ug/ml, ug/g) diazepam detected in liver; dihydrocodeine detected in blood (cavity); 0.201 (ug/ml, ug/g) dihydrocodeine detected in liver; 0.46 (ug/ml, ug/g) hydrocodone detected in liver; 0.091 (ug/ml, ug/g) hydrocodone detected in blood (cavity); 0.999 (ug/ml, ug/g) nardiazepam detected in liver; 0.21 (ug/ml, ug/g) nordiazepam detected in blood (cavity); 0.219 (ug/ml, ug/g) oxazepam detected in liver; 0.43 (ug/ml, ug/g) oxazepam detected in blood (cavity); oxycodone not detected in blood (cavity); oxycodone detected in liver; temazepam detected in liver; 0.094 (ug/ml, ug/g) temazepam detected in blood (cavity); 0.7593 (ug/ml, ug/g) tetrahydrocannabinol (marijuana) detected in heart; 6.3795 (ug/ml, ug/g) tetrahydrocannabinol detected in lung; 0.0959 (ug/ml, ug/g) tetrahydrocannabinol carboxylic acid (marijuana) detected in heart; and 0.1686 (ug/ml, ug/g) tetrahydrocannabinol carboxylic acid detected in lung.

Acetaminophen is an analgesic marketed under the brand name Tylenol. It is available over the counter and by prescription in a number of combination medications. Diazepam is a Schedule IV controlled substance from the benzodiazepine class marketed under the brand name Valium. Nordiazepam is a metabolite of diazepam. Oxazepam and temazepam are psychoactive metabolites of diazepam and in addition are marketed separately as Schedule IV controlled substances under the brand names Serax and Restoril. Codeine, oxycodone, and hydrocodone are unique drugs and not metabolites of one another; all are opiate analgesics (narcotics). Codeine is a Schedule II controlled substance and is marketed in combination with acetaminophen under the brand names Tylenol #2, #3, and #4. Oxycodone is a Schedule II controlled substance and is marketed under brand names Percocet and Roxicet in combination with acetaminophen as well as OxyContin when in isolation. Hydrocodone is a Schedule III controlled substance and is marketed under the brand names Lortab, Vicodin, and Norco. Dihydrocodeine is an active metabolite of hydrocodone. Hydromorphone is an active metabolite of hydrocodone and is a Schedule II controlled substance marketed under the brand name Dilaudid.



## Tests and Research

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The NTSB's Vehicle Recorder Division inspected the PFD memory chips. The visual inspection of the units showed signs of extreme thermal damage to the chips packaging and some bent leads. One chip had a hairline fracture on the back-side of the chip packaging. X-ray imaging of the chips showed no signs of internal damage to either of the chips' die or bond wires. Readouts of the chips were attempted but were unsuccessful. No PFD data was recovered.

The MFD memory card was found in good condition. The card was downloaded using the manufacturers' recommended procedures. The memory card contained 125 data files. One data file was identified as recording during the accident flight. The data file was about 7 minutes in duration.

Three plots of the MFD data were produced by the Vehicle Recorder laboratory and are available with the docket material associated with this accident. The plots cover the time period from 11:14:20 EDT to 11:21:30 EDT. Plot one contains the basic engine parameters, including engine speed, oil pressure, oil temperature, and cylinder temperatures. Plot two contains electrical system and fuel used information. Plot three is a Google Earth image with the recorded flight path. The MFD did not record any altitude information.

The MFD data indicated the airplane started to taxi for takeoff at 11:15:36 and started the takeoff roll at 11:17:54. The airplane departed from runway 7 and turned to a heading of about 170 degrees en route to Urbana, Ohio. The data indicated that the airplane stayed on this heading for about 6 nm until the MFD stopped recording engine data at 11:21:24. The accident site was located about 1.4 nm on a 167 degree heading from the last data point recorded.

About 10 seconds before the MFD stopped recording data, the engine RPM dropped from 2,200 rpm to 1,900 rpm, the manifold air pressure (MAP) decreased from 22 MAP to 15 MAP, the fuel flow dropped from 16 to 9 gallons per hour, and the exhaust gas temperatures recorded a slight decrease in temperature. All engine parameters indicated that the engine was operating within the normal range during the flight up to the time when the MFD stopped recording data.

Approach radar track data was obtained from the air traffic control tower at Port Columbus International Airport, Columbus, Ohio, located about 48 nm from EDJ on a 118 degree heading. The radar track data indicates that an aircraft using the visual flight rules transponder beacon code of 1200 departed runway 7 at EDJ about 11:18. After departure, the aircraft turned to a magnetic heading of about 168 degrees, flying at 2,000 feet about mean sea level (msl), +/- 200 feet. Radar contact was lost with the aircraft 3.4 nm to the south southeast of EDJ at 11:20:17. From 11:19:12 to 11:20:08, the aircraft had an average ground speed of 146 knots. The aircraft's altitude shows a descent from 2,000 feet at 11:15:54 to 1,800 feet at 11:20:08 with an average rate of 869 feet per minute.

At 11:21:59, radar contact was regained on the aircraft for only four radar returns, 7 nm south of EDJ. Assuming a straight line flight track during the lost radar coverage (11:20:17 to 11:21:59), the aircraft had an average ground speed of 136 knots. The last three radar returns show an average ground speed of 40 knots. The last two radar returns (11:22:08 and 11:22:13) show a descent rate of 100 feet (+/- 99 feet) from 2,300 to 2,200 feet msl.



## Additional Information

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The MFD is not equipped with an ON/OFF switch. To disconnect the MFD from electrical power, the MFD circuit breaker located on the Avionics Non-Essential bus would need to be pulled. The circuit breaker panel is located within the pilot's reach next to the central pedestal. Turning off the main avionics switch would disconnect the MFD from electrical power; however, all avionics equipment would be turned off as a result.

The MFD generates new data files for each power-on cycle. The oldest record is dropped and replaced by a new recording once the storage limit has been reached. MFD data are sampled every six seconds, and are recorded to memory once every minute. If an interruption of power occurs during the minute between MFD memory-write cycles, data sampled during that portion of a minute are not recorded.

The transponder is equipped with an ON/OFF switch. The transponder's circuit breaker is located on the Avionics Non-Essential bus.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Silliman, James
<b>Additional Participating Persons:</b>	Randy Poropatich; FAA Columbus FSDO; Columbus, OH Brannon Mayer; Cirrus Aircraft Company; Duluth, MN Chris Lang; Continental Motors ; Mobile, AL
<b>Original Publish Date:</b>	May 8, 2014
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=81740">https://data.nts.gov/Docket?ProjectID=81740</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).