National Transportation Safety Board
Aviation Accident Final Report

Location:	Boynton Beach, FL	**Accident Number:**	ERA12FA068
Date & Time:	11/13/2011, 1736 EST	**Registration:**	N661FT
Aircraft:	CIRRUS DESIGN CORP SR22	**Aircraft Damage:**	Substantial
Defining Event:	Low altitude operation/event	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilots of the non-aerobatic airplane were returning from an air show and flying in formation with two aerobatic airplanes. A pilot of one of the aerobatic airplanes reported that, shortly after the accident airplane crossed the border of an unpopulated wetland area, the airplane's pitch smoothly increased upward to an angle of about 30 degrees. The accident airplane was flying at a global positioning system-derived altitude of 29 feet. The airplane then began a roll to the left, and, as the airplane rolled toward an inverted attitude, the pitch quickly began decreasing below the horizon. The airplane then began a rapid descent and impacted the marsh below in a 68-degree nose-down pitch attitude. Postaccident examination of the wreckage revealed no evidence of any preimpact mechanical malfunctions or failures with the airframe or engine that would preclude normal operation. Flight data recorded by a device onboard the accident airplane, along with statements provided by witnesses, suggested that one of the pilots likely attempted to perform an aileron roll at low altitude and that the maneuver had been performed on at least two previous occasions, at higher altitudes.

The investigation could not determine which of the pilots was physically manipulating the controls at the time of the accident; however, given the right seat pilot's substantial previous flight experience, the provisions of the exclusive agreement under which he rented the accident airplane, and statements from witnesses affirming that the pilot had attempted the maneuver in the past, it is most likely that the right seat pilot was acting as pilot-in-command at the time of the accident and was either manipulating the controls or directing the left seat pilot's manipulation of the controls at the time. The right seat pilot had not logged any previous aerobatic experience, and witnesses described any undocumented experience he may have had as "low." The manufacturer maneuver limits for the accident airplane model prohibit aerobatic maneuvers.

The airplane's ballistic recovery parachute system likely activated during the impact sequence and was not activated by either of the occupants before impact given that the system's safety pin was found installed; it is unlikely that activation of the system would have affected the outcome of the event. Additionally, based on observations of the airplane's occupant restraint systems, recovered positions of the pilots' remains, and preaccident photographs recovered

from an electronic device onboard the airplane, it is unlikely that the right seat pilot was wearing his shoulder restraint. It could not be determined if this apparent lack of upper body restraint may have inhibited the right seat pilot's ability to control the airplane during the maneuver.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The right seat pilot's decision to attempt a low-altitude aerobatic maneuver in a non-aerobatic airplane.

Findings

Personnel issues	Decision making/judgment - Pilot (Cause)

Factual Information

HISTORY OF FLIGHT

On November 13, 2011, at 1736 eastern standard time, a Cirrus Design Corp SR22, N661FT, was substantially damaged when it impacted terrain within the Loxahatchee National Wildlife Refuge near Boynton Beach, Florida. The certificated commercial pilot and the certificated private pilot were fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the flight. The personal flight, which originated at Witham Field (SUA), Stuart, Florida about 1722, was operated under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91.

The pilots were returning from an air show at SUA, with a presumed destination of Willis Gliderport (FA44), Boynton Beach, Florida. Flying in formation with the accident airplane were a Sukhoi Su-29 and an Extra EA-300, each piloted by a friend of the commercial pilot. After joining in formation about 10 nautical miles south of SUA, the flight proceeded southwest.

Shortly after the flight crossed the northern border of the Loxahatchee National Wildlife Refuge, the pilot of the Su-29 observed the accident airplane's pitch smoothly increase upward to an angle of about 30 degrees. The airplane then began a roll to the left, and pitched nose-down as it rolled to an inverted attitude. As the airplane descended, it began to roll right, before it impacted the marsh below in an approximate 80-degree nose-down pitch attitude.

The pilot of the Su-29 subsequently entered a left orbit around the accident site and contacted air traffic control to report the accident.

PERSONNEL INFORMATION

Information provided by the Palm Beach County Medical Examiner, and photographic information recovered from the wreckage, confirmed the seating position (left/right) of each pilot.

The right seat pilot, age 34, held a commercial pilot certificate with ratings for airplane single and multi-engine land, rotorcraft helicopter, and instrument airplane and helicopter. According to his Federal Aviation Administration (FAA) airman file, the right seat pilot obtained a private pilot certificate with a rating for airplane single engine land on May 17, 1996. He subsequently obtained numerous category and class ratings, a commercial pilot certificate, and a type rating between the time of the issuance of his private pilot certificate and February 2004. On February 17, 2006, the pilot submitted a letter of surrender to the FAA, which constituted an "unequivocal abandonment" of his commercial pilot certificate. The stated reason for the surrender was, "Voluntary surrender in anticipation of FAA certificate action." No further details regarding the precipitating circumstances of the anticipated FAA certificate action were contained within the file. On August 31, 2008, the right seat pilot obtained a student pilot certificate, and between that time and June 2010, the pilot obtained all of the certificates and ratings held at the time of the accident.

Two of the right seat pilot’s personal pilot flight logs were recovered from the accident site that documented flights between December 2004 and September 2011. The combined total flight experience documented in both logs was 4,384 hours, 183 hours of which were in the accident airplane make and model. A survey of the various airplane and helicopter make/model aircraft

represented in both logbooks showed that the pilot had not logged any previous flight experience in aerobatic aircraft during this period.

The pilots of the other aircraft flying in formation with the accident airplane enroute to SUA, and during the accident flight, provided characterizations of the right seat pilot during separate post-accident interviews. The pilots consistently described the right seat pilot as, “a really good stick,” and an “adrenaline junkie.” They described his aerobatic flight experience as “low,” and stated that he may have had participated in some previous aerobatic flights with other pilots in aerobatic aircraft; however he was not known within the group to be a pilot with aerobatic experience.

One of the pilots stated he was “aware” that the right seat pilot had “rolled the Cirrus” in the past, but that he had never personally observed the right seat pilot perform the maneuver. Specifically, the pilot was aware that the right seat pilot had rolled the accident airplane through 360 degrees of continuous roll during a flight from Boca Raton Airport (BCT), Boca Raton, Florida to FA44. The pilot never heard the right seat pilot talk about the maneuver, though, as he was “not the type of person to brag about something like that.” The pilot finally stated regarding the accident flight, “everyone was confident that [the right seat pilot] tried to roll it,” and that there was nothing mechanically wrong with the accident airplane.

The left seat pilot, age 23, held a private pilot certificate with ratings for airplane single engine land and instrument airplane. He obtained his private pilot certificate on November 1, 2006, and his instrument rating on August 28, 2010. No personal flight logs for the left seat pilot were available for review.

On the left seat pilot's application for his instrument rating, he reported he possessed 168 total hours of flight experience. Additional review of records provided by the operator showed that as of January 2011, the left seat pilot had accumulated 195 total hours of experience. Since that time, the left seat pilot had accumulated 12 additional flight hours in various make and model aircraft provided by the operator, none of which were the accident airplane or the accident airplane make and model.

AIRCRAFT INFORMATION

According to aircraft registration information provided by the FAA, the airplane was manufactured in 2008. Review of maintenance logs showed that the airplane’s most recent annual inspection was completed on October 6, 2011 at 733 total aircraft hours. When the right seat pilot took possession of the airplane on November 11, 2011, the airplane had accumulated 765 total hours of operation.

The airplane was operated by Air Orlando Airplane Flight Training and Rental, LLC (doing business as Air Orlando Flight School) as a rental aircraft available for flight training, and was also available for 14 CFR Part 135 flights. According to the operator, the airplane was rented to the right seat pilot for his personal use from November 11, 2011 through November 13, 2011. According to the operator’s rental agreement, “Renter agrees that rented aircraft shall not be used or operated… By any person other than the Renter who signed the agreement without the express written approval of Air Orlando Flight School.” Several rental agreements were on file with the operator for the left seat pilot; however none of the agreements pertained to the accident airplane.

METEOROLOGICAL INFORMATION

The weather conditions reported at Palm Beach International Airport (PBI), West Palm Beach, Florida, located about 12 nautical miles northeast of the accident site, at 1753, included winds from 60 degrees at 8 knots, visibility 10 statute miles, few clouds at 3,100 feet, a temperature of 24 degrees Celsius (C), a dewpoint of 18 degrees C, and altimeter setting of 30.12 inches of mercury.

Sunset occurred at 1731 and the end of civil twilight occurred at 1755. At 1735 the sun was 1.7 degrees below the horizon, at an azimuth of 250 degrees magnetic.

FLIGHT RECORDERS

Recoverable Data Module (RDM)

A crash-hardened flight data recording device was installed in the vertical stabilizer of the accident airplane, and was recovered from the airplane at the accident site. The RDM recorded numerous critical flight parameters at a rate of 1 Hz. Data from the RDM were recorded without incident, and about 145 hours of flight time were present. The data contained the entirety of the accident flight, and further review showed two other flights of interest to the investigation. All altitudes given below are pressure altitudes recorded by the RDM, unless otherwise stated.

On November 11, 2011, two days prior to the accident flight, the airplane departed BCT at 1654 and climbed to an altitude of about 2,000 feet, before beginning a shallow descent to 1,800 feet. At 1658, the airplane began to pitch up and roll to the left, reaching about 30 degrees of nose-up pitch and completing 360 degrees of roll. The airplane then continued to FA44, and landed at 1701.

On the morning of the accident flight, the airplane departed from BCT at 1030 and climbed to an altitude of 1,500 feet. At 1037, the airplane began descending and leveled off at an altitude of about 600 feet at 1048. At 1057, the airplane began pitching nose-up and rolling to the left, reaching 32 degrees of nose-up pitch and completing 360 degrees of roll. The airplane completed a low pass down runway 12 at SUA at a GPS altitude of less than 75 feet and an indicated airspeed of 142 knots before it climbed to about 500 feet, circled the airport, and landed at 1105.

On the accident flight, the airplane departed from SUA at 1722 and climbed to about 1,000 feet. Over the next 11 minutes, the airplane remained between 500 and 1,000 feet as it flew to the southwest. At 1734:53, the airplane descended through a GPS altitude of 161 feet, and the measured pressure altitude was 0 feet. Over the next 1 minute 24 seconds, the GPS altitude varied from a high of 195 feet to a low of 38 feet, while the pressure altitude recorded an invalid negative value. Beginning at 1736:18, while flying at a GPS altitude of 61 feet, the airplane began a roll to the left that reached a maximum bank angle of 66 degrees about 4 seconds later. The airplane then began rolling back to the right, and at 1736:19 reached a maximum right bank angle of 70 degrees, after climbing to a GPS altitude of 308 feet. At that time, the recorded pressure altitude was 109 feet. The airplane returned to a relatively level roll attitude about 4 seconds later.

Shortly after, the airplane began descending again, reaching a low GPS altitude of 145 feet at 1736:33. At that time, the pressure altitude was recorded as an invalid negative value. The pitch angle then began to increase, reaching a maximum of 27 degrees nose-up at 1736:36, at a GPS altitude of 129 feet, and a pressure altitude of 29 feet. Within 2 seconds, a left roll began that continued past 90 degrees, and as the roll increased, the pitch angle also began to rapidly

decrease. As the airplane reached 178 degrees of left roll, the pitch had decreased to 30 degrees nose-down, at a maximum pressure altitude of 353 feet. The airplane then began to descend, and the pitch continued to decrease to 67 degrees nose-down one second later, as the roll transitioned past inverted to 138 degrees of right roll. The final recorded data point, one second later, showed the airplane in a 68 degree nose-down pitch attitude and a 42-degree right roll, at a pressure altitude of 205 feet and an airspeed of 156 knots. The normal acceleration (g loading) of the airplane varied from 0.96gs at the beginning of the pitch up, to 0.1gs as the airplane reached 103 degrees of left roll, to a maximum of 3.67gs, recorded 1 second prior to the final recorded data point.

Mobile Device Images

A Research in Motion BlackBerry 9700 mobile device was recovered from the wreckage and examined to determine whether relevant photographs or video were present. A microSD flash memory card was extracted from the device and found to contain 14 photos and 14 videos that were captured on the day of the accident. The photo and video files were time stamped in the file name with the date and local time of the capture, accurate to the nearest minute.

One photo, captured at 1054 on the day of the accident, showed the accident airplane as it flew in close formation with another aircraft, from which the photo was taken. The final four photos, captured between 1730 and 1733, were taken from within the accident airplane in flight. Two of the photos depicted two other airplanes flying in a trailing formation off of the accident airplane's right wing, while one of the later photos shows one airplane in a trailing formation off of the accident airplane's left wing. The airplanes immediately off of the accident airplane's left and right wings in the two photos appeared to be the same, though the registration number was not visible in either photo. One of the photos also showed that the left seat pilot was wearing a black t-shirt and that both shoulder restraints were on, while another photo showed that the right seat pilot was wearing a gray t-shirt. Only the right shoulder of the right seat occupant was visible, and the occupant did not appear to be wearing that shoulder restraint.

A video captured at 1050 on the day of the accident, with the device operator seated in the left seat of a helicopter, showed the accident airplane flying in the lead of a formation to the left of the helicopter, and a green and yellow Extra 300, registration N999AS, flying in formation behind and to the left of the accident airplane. The next video, captured at 1051, showed the green and yellow Extra 300 flying inverted just ahead and to the left of the accident airplane. The Extra 300 then rolled to the left and dipped below the accident airplane before disappearing from view beneath of the nose of the helicopter. Review of the RDM data showed that at 1051, the accident airplane was flying at a GPS altitude of about 500 feet, and a pressure altitude of about 250 feet.

WRECKAGE AND IMPACT INFORMATION

The accident site was located in a marshland, about 15 nautical miles southwest of North Palm Beach County General Aviation Airport (F45), West Palm Beach, Florida. The wreckage exhibited severe fragmentation and was submerged under a layer of water and mud that was estimated to be about 15 feet deep. Portions of the wreckage recovered included all flight control surfaces, the empennage, portions of both wings, and portions of the fuselage. The engine, firewall, instrument panel, and portion of the fuselage around the center wing spar were recovered about 2 months after the accident.

The fuselage was fragmented, and some of the identified components included the left and right side fuselage skins, upper and lower engine cowlings, baggage compartment floor, roll cage, and ceiling components. A fragment and a door hinge from the right cabin door were observed. Fragments from the left cabin door were observed. The baggage door was not observed.

The empennage remained intact and had separated from the aft portion of the cabin. The horizontal stabilizer remained attached to the empennage and exhibited impact damage. The left elevator remained attached to the horizontal stabilizer by only the inboard attach point and exhibited impact damage. The right elevator remained attached to the horizontal stabilizer and exhibited impact damage. The pitch trim motor was in an approximate neutral position.

The wings were fragmented, and some of the identified portions included the upper and lower wing skins, torque box components, spar, aft shear web, and both wingtips. Both upper wing skins exhibited aft buckling and crushing along their entire length. The right and left ailerons were separated from the wing and exhibited impact damage. The roll trim motor was positioned between neutral and full left trim. The right and left flaps were separated from the wing and exhibited impact damage. On both flaps, the inboard and mid-span hinges were present with appropriate hardware and safeties at the hinge point. The flap actuator shaft separated from the flap motor and the shaft was not observed.

The right main landing gear assembly remained attached to a fragment of torque box structure. The majority of fairings had separated from the assembly. The left main landing gear assembly was not observed, though a corresponding wheel pant fragment was noted. The upper portion of the nose landing gear assembly remained attached to a portion of engine mount weldment, but the strut and wheel assembly was not observed.

The left front pilot seat was separated from its seat tracks. The lower frame of the seat had deformation present. The seatbelt airbag had inflated, and the vent holes exhibited “squaring.” The seatbelts had been cut by recovery personnel. The nylon webbing of the seatbelt harness had load bar marks in the fabric at the location of the buckle and load bars. The measured distance between the end of the seatbelt and the load-bar marks on the nylon webbing was approximately 10 inches on the flat tab side, and 11 inches on the buckle side of the seatbelts. The energy absorption module exhibited crushing.

The right front crew seat was separated from its seat tracks. The lower frame of the seat had deformation present. The airbag seatbelt had inflated, and the vent holes exhibited “squaring.”

The nylon webbing of the seatbelt showed a load bar mark. The energy absorption module exhibited crushing.

The airplane was equipped with a whole-airframe ballistic recovery parachute system. Examination of the recovered components from the system revealed that the rocket motor had ignited and expended its fuel, and that the packed parachute assembly had ejected from the wreckage. The system's activation handle was recovered intact, with the safety pin installed.

The engine exhibited extensive impact-related damage and evidence of water immersion, and was impacted with mud. Both the induction system and exhaust system separated free from their respective mounting locations. A portion of the No. 1 and No. 6 cylinder exhaust risers remained attached to their respective cylinder heads. The remaining portions of the exhaust system were not recovered. All six induction risers separated from their respective mounting locations. The induction manifold was located separated from the engine and exhibiting

impact-related damage.

The left and right magnetos separated from their respective mounting locations and remained attached to the engine via their ignition leads. The magnetos were not free to rotate. Internal inspection of the right magneto revealed that distributor gear was impacted with mud and debris. All twelve spark plugs exhibited water immersion contamination around the center electrodes.

The fuel pump drive was not free to rotate, and the fuel pump drive coupling was intact and undamaged. The fuel pump was disassembled and internally filled with water immersion-related debris. The fuel manifold valve screen was absent of obstructions or contaminants, and the diaphragm plunger seal visually appeared intact and undamaged. The throttle body and metering unit were intact and found separated from their respective mounting locations. The throttle plate was found in the closed position, and the control arms were intact and actuated freely by hand.

The oil pump drive shaft was intact and exhibited normal wear signatures. The oil pump cavity contained light scratches, rotational scoring and several vertical grooves. The inside of the oil pump housing did not exhibit signatures of hard particle passage. The oil pump gear teeth exhibited normal operating signatures. The oil pressure relief valve and seat exhibited light polishing and normal operating signatures. The oil scavenge pump was intact and undamaged. The oil scavenge pump cavity contained light scratches and no evidence of hard particle passage. The oil scavenge pump gear teeth exhibited normal operating signatures. The oil filter was cut open and no metallic material was observed within the filter element. The oil was dark brown in color.

Prior to the rotation of the crankshaft, the cylinders were examined with a lighted borescope to verify that no foreign objects, debris, or fluids resided in the cylinder bore area. Several of the cylinders were full of mud and miscellaneous debris. Thumb compression and valve train continuity were established through rotation of the crankshaft at the propeller flange. The engine rotated freely, and a light amount of binding was noted.

Both turbochargers were separated free from the engine, were not free to rotate, and exhibited a significant amount of impacted mud and debris in both the intake and exhaust housings. The turbine blades were intact. The center housing oil inlet and outlet fittings were intact, and there were no signatures of oil leakage. The compressor housings were intact and exhibited impact-related bending. The compressor housings were attached securely to their center housing. The compressor blades were intact and exhibited leading edge gouging and bending signatures.

The propeller hub remained attached to the crankshaft propeller flange and exhibited rotational signatures on the spinner. All three propeller blades separated free from the propeller hub. Only blade No.2 was recovered from the accident site. The blade separated from its respective hub at its root, and the outboard-most five inches of the No.2 blade was separated from the blade and not recovered. The blade also exhibited a span-wise split near the midsection of the blade from the root to the tip.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on both occupants by the Office of the District Medical Examiner, West Palm Beach, Florida. The cause of death for both occupants was "multiple blunt traumatic injuries." The remains of the left seat pilot were recovered from the accident site secured to the left pilot seat by all 4 points of the restraint system. The report also noted that

the left seat pilot was wearing a black t-shirt. The remains of the right seat pilot were recovered free of any restraints, and due to the level of fragmentation of the wreckage, could not be immediately associated with a pilot seat. The report noted that the right seat pilot was wearing a gray t-shirt.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing on both pilots. No carbon monoxide or cyanide was detected in blood samples for either pilot. No drugs were detected in the urine of the left seat pilot, and Ibuprofen was detected in the urine of the right seat pilot. The left seat pilot's blood and urine tested positive for Ethanol in concentrations of 35 and 12 milligrams/deciliter (mg/dL), respectively, and N-propanol in concentrations of 7 and 1 mg/dL, respectively. Ethanol in concentrations of 14 and 10 mg/dL were detected in the blood and urine of the right seat pilot. The samples from both pilots were positive for putrefaction.

ADDITONAL INFORMATION

On-Ground Witness Statements and Radar Information

On the evening of the accident flight, a witness stated that while walking his dogs near his home, he observed a flight of 3 airplanes as they flew overhead at an altitude of less than 1,000 feet above the ground. The airplanes were flying southbound in a close formation, about several wing lengths apart, coming from the direction of SUA. The witness's home was located about 540 feet east of the accident airplane's RDM recorded position at 1729:18. At that time, the airplane was flying at a recorded pressure altitude of 521 feet. According to radar data provided by the FAA, a radar target with a 1200 transponder code and a reported altitude of 500 feet was also observed at that time, about 100 feet northwest of the accident airplane's RDM recorded position.

A second witness stated that he was standing on the ground at F45 on the evening of the accident flight with an acquaintance when he heard several airplanes flying directly over the airport that were "loud and low." He remarked to his acquaintance about how close each of the airplanes was flying to the others as they flew from the northeast to the southwest. The airplane that was trailing in the formation began to lag behind when the witness looked away. Just then, the acquaintance remarked, "Whoa, that guy snapped a roll!," referring to the lagging airplane in the formation. At 1730:47, the accident airplane's RDM-recorded position was directly above the segmented circle at F45, and the recorded pressure altitude was 591 feet. Two radar targets with 1200 transponder codes were recorded at that time. One was located 200 feet northwest of the accident airplane's RDM recorded position at a reported altitude of 700 feet, while the other was recorded about 1,600 feet north of the accident airplane's recorded position at a reported altitude of 700 feet.

A third witness observed two or three airplanes of a low wing, sport configuration flying southwest in close formation near his home at an estimated altitude between 1,500 and 2,000 feet. One of the airplanes, "did a barrel roll" before he lost sight of the formation behind trees. The accident airplane's RDM recorded position at 1732:21 was about 1.1 nautical miles southeast of the witnesses' home, flying at a recorded pressure altitude of 692 feet. A radar target with a 1200 transponder code was observed about 280 feet north of the accident airplane's RDM recorded position at that time, at a reported altitude of 800 feet.

Aerobatic Flight

Title 14 CFR Part 91.303 defines aerobatic flight as, "an intentional maneuver involving an

abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight." The regulation further dictates that no person may operate an aircraft in aerobatic flight below an altitude of 1,500 feet above the surface. Additionally, Title 14 CFR Part 91.307 prohibits the execution of any intentional maneuver that exceeds 60 degrees of bank relative to the horizon or any nose-up or nose-down pitch attitude greater than 30 degrees relative to the horizon unless each occupant of the aircraft is wearing an approved parachute.

The Cirrus Design SR22 Airplane Information Manual explicitly dictates the maneuvering limitations for the airplane and states, "Aerobatic maneuvers are prohibited." The manual further states, "This airplane is certified in the normal category and is not designed for aerobatic operations. Only those operations incidental to normal flight are approved. These operations include normal stalls, chandelles, lazy eights, and turns in which the angle of bank is limited to 60°."

According to The Basic Aerobatic Manual by William K. Kershner (2001), when performing an aileron roll, "The airplane is rolled about the longitudinal axis, using coordinated controls, and as the name implies, the ailerons are the primary control for this maneuver." The text then describes the initial actions necessary to perform a left aileron roll as: "Pull the nose up smoothly (wings level) to 30° above the horizon. Relax the back pressure slightly to maintain this pitch attitude as you start applying left aileron and rudder as if entering a steep turn. Continue to increase the aileron rapidly (but smoothly) until the maximum is obtained. When the airplane rolls past a 45° bank, use less rudder to avoid pulling the nose down below the horizon (pulling it off-heading). As 90° of roll is passed, start relaxing the back pressure more. The ailerons are still fully deflected and the back pressure remains relaxed. As the airplane reaches the inverted position, nearly but not all back pressure has been released in an attempt to keep the nose above the horizon. The nose gradually moves down as the maneuver progresses, even with no back pressure. (Had the initial back pressure needed to pull the nose up been continued, the nose would have been "pulled" down well below the horizon as the airplane approached the inverted position)." (Kershner, William K. 2001. The Basic Aerobatic Manual. Ames, Iowa: Blackwell Publishing).

History of Flight

Maneuvering-aerobatics	Low altitude operation/event (Defining event)
Maneuvering-low-alt flying	Loss of control in flight

Pilot Information

Certificate:	Commercial	**Age:**	34, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without Waivers/Limitations	**Last FAA Medical Exam:**	11/18/2010
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	4384 hours (Total, all aircraft), 183 hours (Total, this make and model)		

Pilot Information

Certificate:	Private	**Age:**	23, Male
Airplane Rating(s):	Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without Waivers/Limitations	**Last FAA Medical Exam:**	08/26/2010
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	08/28/2010
Flight Time:	207 hours (Total, all aircraft), 0 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N661FT
Model/Series:	SR22	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	3119
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	10/06/2011, Annual	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	587 Hours as of last inspection	**Engine Manufacturer:**	Continental Motors Inc.
ELT:	C126 installed, not activated	**Engine Model/Series:**	IO-550-N
Registered Owner:	MANN AVIATION LLC	**Rated Power:**	310 hp
Operator:	Air Orlando Inc.	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Dusk
Observation Facility, Elevation:	PBI, 20 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	1753 EST	**Direction from Accident Site:**	60°
Lowest Cloud Condition:	Few / 3100 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	60°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	24°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Stuart, FL (SUA)	**Type of Flight Plan Filed:**	None
Destination:	Boynton Beach, FL (FA44)	**Type of Clearance:**	None
Departure Time:	1722 EDT	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	26.600556, -81.805000 (est)

Administrative Information

Investigator In Charge (IIC):	Dennis Diaz	**Report Date:**	05/30/2013
Additional Participating Persons:	Bruce Schemmel; FAA/FSDO; Miramar, FL Bradley T Miller; Cirrus Aircraft Corporation; Duluth, MN Jason Lukasik; Continental Motors Inc.; Mobile, AL		
Publish Date:	05/30/2013		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=82285		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.