Aviation Investigation Final Report

Location:	Melbourne, Florida	**Accident Number:**	ERA12FA196
Date & Time:	February 29, 2012, 17:01 Local	**Registration:**	N544SR
Aircraft:	CIRRUS DESIGN CORP SR22	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Several airplanes and a helicopter were in the traffic pattern at the tower-controlled airport performing simultaneous operations to parallel runways (9L and 9R) around the time of the accident. The accident pilot contacted the tower air traffic controller while south of the airport requesting a full-stop landing; the controller advised the pilot to report when the airplane entered the downwind leg of the traffic pattern. The controller subsequently cleared the accident airplane to land and expected the pilot complete a "normal" downwind traffic pattern and land behind the airplane already established on final approach for runway 9R; however, the controller did not provide sequencing instructions. The accident airplane proceeded directly to a tight right-base entry into the traffic pattern for landing on runway 9R, contrary to the controller's original expectation but permissible based on the clearance to land. The controller radioed the accident pilot to confirm that he had visual contact with the airplane on a 1-mile final approach for runway 9R (the traffic was 300 feet below and 1 mile west). This was the first indication by the controller to the accident pilot that there was additional landing traffic sequenced to the same runway he had been cleared to land on. The accident pilot replied that he was on a "real short base" for runway 9R, and the controller responded, "no sir, I needed you to extend to follow the [airplane] out there on a mile final, cut it in tight now, cut it in tight for nine right." The two airplanes had closed within 1/2 mile of each other, but were still separated by 300 feet altitude. The pilot of the airplane on short final for 9R maintained situational awareness throughout, perceived the conflict before the controller or the accident pilot, and responded calmly and benignly to the conflict. The accident pilot needed only to arrest his descent, at a minimum, to avoid any collision. A flight instructor and an airline pilot both described seeing the accident airplane pitch up, bank left, then roll inverted. The flight instructor stated that this action occurred as the controller was "yelling at" the pilot. Both witnesses described what they saw as "an accelerated stall." Data extracted from the multifunction and primary flight displays revealed that the airplane pitched up and rolled inverted to the left at the same time that engine power was increased rapidly. When engine power is increased, a pilot must apply sufficient right rudder to counteract the left-rolling

tendency, particularly if the airspeed is slow and the angle of attack is high, as it would be during landing. When instructed by the controller to "cut it in tight," the accident pilot over-controlled the airplane, lost control, and impacted terrain. Contributing to the traffic conflict was the controller's lack of upfront sequencing instructions or subsequent sequencing instructions when the accident aircraft was cleared to land. Examination of the data and a postaccident examination of the wreckage revealed no preimpact mechanical anomalies 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 abrupt maneuver in response to a perceived traffic conflict, which resulted in an accelerated stall and a loss of airplane control at low altitude. Contributing to the accident was the air traffic controller's incomplete instructions, which resulted in improper sequencing of traffic landing on the same runway.

Findings

Aircraft	Airspeed - Not attained/maintained
Personnel issues	Incorrect action performance - Pilot
Environmental issues	ATC clearance procedure - Compliance w/ procedure

Factual Information

History of Flight

Approach-VFR pattern base	Aerodynamic stall/spin (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On February 29, 2012, about 1701 eastern standard time, a Cirrus SR22, N544SR, was substantially damaged when it collided with terrain following an uncontrolled descent while maneuvering for landing at the Melbourne International Airport (MLB), Melbourne, Florida. The certificated private pilot and two passengers were fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight, which was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

Review of air traffic control information revealed that there were several airplanes and a helicopter in the traffic pattern at MLB, performing simultaneous operations to parallel runways, around the time of the accident. About 1658, the accident pilot contacted the MLB air traffic control tower (ATCT) from a position 5 miles south of the airport, and requested a full-stop landing. The pilot was instructed to report when the airplane was on the downwind leg of the traffic pattern for runway 9 Right (9R). Shortly after, a Cirrus SR20, which was on an approximate 5-mile final approach for runway 9R, was cleared for a touch-and-go landing. At 1700:02, the controller advised that the pilot could either land on runway 9R, or extend the downwind leg for approximately 6 miles to follow a Cessna landing on runway 9 Left. The accident pilot responded, "9 right's fine," and requested a long landing in order to reduce taxi time to the fixed-base operator (FBO). At 1700:16, the ATCT cleared the accident airplane for landing on runway 9R.

At 1700:47, the ATCT radioed the accident pilot to confirm that he had visual contact with the Cirrus SR20 on a one-mile final approach for runway 9R. The accident pilot replied that he was on a "real short base" for runway 9R. At 1700:57, the ATCT then instructed the accident pilot, "no sir, I needed you to extend to follow the Cirrus out there on a mile final, cut it in tight now, cut it in tight for nine right."

At the time the accident airplane was advised of the landing traffic on final approach for the same runway, the conflicting traffic was about 300 feet below and 1 mile to its west. At the time the accident airplane was advised to "cut it in tight" to Runway 9R, the two airplanes had closed to within one-half mile of each other, but were still separated by 300 feet of altitude.

A flight instructor and a student pilot were flying the Cirrus SR20 on final approach for runway 9R at the time of the accident. According to the instructor, his airplane was on a one-mile final when he heard the accident airplane announce a "short right base" for runway 9R. He assumed control of the airplane from his student, increased engine power, and began a "shallow climb/turn" to the left towards the grass infield between the parallel runways.

The flight instructor further stated, "[The airplane] was northbound on a right base for 9R. He began a 30-45 degree bank turn to the left in front of us at our one o'clock. I didn't have to make any abrupt maneuvers to avoid the traffic but I continued my turn/climb to the left and started to go-around…[The controller] was yelling at him on the radio. I don't remember the exact words but the more tower yelled, the more the aircraft yanked and banked. I then witnessed an accelerated stall, 90 degree bank angle with a one to two turn spin that ended up nose first into the ground."

The first officer of an airliner witnessed the accident from the cockpit of his airplane while parked on taxiway Alpha, facing west, while waiting for a takeoff clearance from runway 9R. He said the accident airplane was "about 200-300 feet AGL, appeared slightly fast, and in a right turn of 30-40 degrees of bank descending for the runway." The airplane then made an "abrupt" left turn, while simultaneously leveling or "attempting to climb" and "clearly initiated an accelerated stall" about 150-200 feet above the ground. The airplane continued to roll left until inverted, and then descended nose-down to ground contact.

The first officer, as well as other witnesses who gave similar accounts, observed the Cirrus Airframe Parachute System (CAPS) deploy from the airplane prior to ground contact.

PERSONNEL INFORMATION

According to FAA records, the pilot held a private pilot certificate with a rating for airplane single engine and instrument airplane. His most recent third-class FAA medical certificate was issued on June 24, 2010. He reported 365 total hours of flight experience on that date.

A review of the pilot's logbook revealed that he had logged 515 total hours of flight experience, of which 296 were in the accident airplane make and model. The logbook showed that the pilot's last biennial flight review was conducted on April 30, 2009.

AIRCRAFT INFORMATION

According to FAA records, the airplane was manufactured in 2007. It was a four-seat, low-wing airplane of composite construction that was equipped with a Teledyne Continental IO-550-N, 310-hp reciprocating engine. The airplane's most recent annual inspection was completed in August 2011, at which time the airframe had accumulated 1,250 total hours.

The maximum allowable gross weight for the airplane was 3,400 pounds. Based on occupant weights and the airplane's fuel load, the estimated gross weight of the airplane at the time of the accident was 3,379 pounds.

METEOROLOGICAL INFORMATION

The 1753 recorded weather observation at MLB included wind from 130 degrees at 13 knots gusting to 18 knots, clear skies, 10 miles of visibility, temperature 24 degrees C, dew point 20 degrees C, and an altimeter setting of 30.11 inches of mercury.

FLIGHT RECORDERS

An Avidyne Primary Flight Display (PFD) and Multifunction Display (MFD) were recovered from the wreckage and forwarded to the NTSB Recorders Laboratory in Washington, DC.

An NTSB recorders specialist downloaded the data from both displays and prepared a Specialist's Factual Report. According to the report, the engine and flight data were consistent with the airplane descending on a northerly heading. During the last minute of the flight, the airplane was descending at about 500 feet per minute, as it slowed to about 100 knots airspeed.

At 17:00:56, engine rpm increased from about 1,500 to 2,000 rpm, and the airplane rolled left until it was inverted. At 17:00:59, the airplane began to pitch down, and reached an approximate 65-degree nose-down attitude and about 2,000 feet-per-minute rate of descent. The last data was recorded on the airplane at 17:01:04. Neither autopilot nor flight director were used during the accident flight.

WRECKAGE AND IMPACT INFORMATION

The airplane was examined at the accident site on March 1, 2012, and all major components were accounted for at the scene. The wreckage all closely surrounded the initial impact crater. The three-bladed propeller was buried in the crater, and separated from the engine at the propeller. Once unearthed, one blade was found separated, and two blades remained in the hub. All three blades displayed similar aft bending, leading edge gouging, and chordwise scratching. The engine was removed from the crater, separated from the wreckage, and moved to a hangar for examination.

The engine compartment, firewall, instrument panel, and cockpit and cabin area were all destroyed by impact. The empennage and tail section remained largely intact. Control cable continuity was established from the flight control surfaces in the tail to the cockpit area. Control cable continuity could not be established to the control surfaces in the wings due to multiple cable breaks; however, all cable breaks displayed signatures consistent with overload failure.

The CAPS parachute was found deployed, and entangled in the wreckage. Witness statements and the location of the CAPS components at the wreckage site were consistent with a low-altitude deployment.

The engine was examined at MLB on March 3, 2012. The engine was rotated through the secondary alternator drive pad, and approximately 180 degrees of rotation was achieved. Rotation was limited by impact damage to the crankshaft at the propeller flange, and several bent pushrod housings. The crankshaft separation exhibited overload signatures with cracking perpendicular to the longitudinal axis of the shaft. Fuel was observed at the fuel pump outlet, and inside the pump. The fuel manifold valve was removed, and disassembly revealed several ounces of fuel inside. All fuel was absent of water and debris.

The upper spark plugs were removed, and the electrodes were intact and ashen in color. A borescope examination of all six cylinders revealed normal wear, and no abnormal deposits. Both magnetos were removed, and the right magneto produced spark at all six towers. The left magneto was impact damaged, and could not be rotated. Disassembly revealed that the magneto driveshaft was bent by impact.

The oil pump displayed normal function when the engine crankshaft was rotated. The pump was removed, and the oil captured was clear and absent of debris. The interior of the oil pump housing did not reveal any evidence of hard particle passage.

ADDITIONAL INFORMATION

Air Traffic Control

On March 5, 2012, an air traffic control group was convened by an NTSB air safety investigator (air traffic) at the MLB air traffic control tower. The NTSB investigator toured the facility, conducted interviews, reviewed voice and radar recordings, and prepared a factual report.

According to the report, the controller expected the accident airplane to report when it entered the downwind leg of the traffic pattern as instructed, and subsequently complete a "normal" traffic pattern and land behind the Cirrus SR20 on final approach. However, examination of communications recordings revealed that the controller cleared the accident airplane to land, but did not provide sequencing instructions. The accident airplane then proceeded directly to a right-base entry into the traffic pattern for landing on Runway 9R.

According to FAA-H-8083-25, Pilot's Handbook of Aeronautical Knowledge:

"The effect of torque increases in direct proportion to engine power, airspeed, and airplane attitude. If the power setting is high, the airspeed slow, and the angle of attack high, the effect of torque is greater. During takeoffs and climbs, when the effect of torque is most pronounced, the pilot must apply sufficient right rudder pressure to counteract the left-turning tendency and maintain a straight takeoff path."

According to FAA Advisory Circular AC-61-67C Stall and Spin Awareness Training:

"Center of Gravity (CG). The CG location has a direct effect on the effective lift and AOA [angle of attack] of the wing, the amount and direction of force on the tail, and the degree of stabilizer deflection needed to supply the proper tail force for equilibrium. The CG position, therefore, has a significant effect on stability and stall/spin recovery. As the CG is moved aft, the amount of elevator deflection needed to stall the airplane at a given load factor will be reduced. An increased AOA will be achieved with less elevator control force. This could make the entry into inadvertent stalls easier, and during the subsequent recovery, it would be easier to generate higher load factors due to the reduced elevator control forces. In an airplane with an extremely aft CG, very light back elevator control forces may lead to inadvertent stall entries and if a spin is entered, the balance of forces on the airplane may result in a flat spin. Recovery from a flat spin is often impossible. A forward CG location will often cause the stalling AOA to be reached at a higher airspeed. Increased back elevator control force is generally required with a forward CG location.

"Weight. Although the distribution of weight has the most direct effect on stability, increased gross weight can also have an effect on an aircraft's flight characteristics, regardless of the CG position. As the weight of the airplane is increased, the stall speed increases. The increased weight requires a higher AOA to produce additional lift to support the weight.

"Accelerated Stalls. Accelerated stalls can occur at higher-than-normal airspeeds due to abrupt and/or excessive control applications. These stalls may occur in steep turns, pullups, or other abrupt changes in flightpath. Accelerated stalls usually are more severe than unaccelerated stalls and are often unexpected because they occur at higher-than-normal airspeeds"

Pilot Information

Certificate:	Private	**Age:**	44,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
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:**	June 24, 2010
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	April 30, 2009
Flight Time:	515 hours (Total, all aircraft), 350 hours (Total, this make and model), 28 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N544SR
Model/Series:	SR22	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2559
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	August 30, 2011 Annual	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1250 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-550-N
Registered Owner:	THOMAS VERNON E	**Rated Power:**	310 Horsepower
Operator:	THOMAS VERNON E	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MLB,33 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	16:53 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots / 18 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.11 inches Hg	**Temperature/Dew Point:**	24°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Valkaria, FL (X59)	**Type of Flight Plan Filed:**	None
Destination:	Melbourne, FL (MLB)	**Type of Clearance:**	VFR
Departure Time:	16:55 Local	**Type of Airspace:**	

Airport Information

Airport:	Melbourne International MLB	**Runway Surface Type:**	Asphalt
Airport Elevation:	33 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	09R	**IFR Approach:**	None
Runway Length/Width:	10181 ft / 150 ft	**VFR Approach/Landing:**	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	28.092777,-80.659721(est)

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	LeRoy Stromenger; FAA/FSDO; Orlando, FL Brannon D Mayer; Cirrus Aircraft; Duluth, MN Jason Lukasik; Continental Motors Inc.; Mobile, AL
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Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=82994