



# Aviation Investigation Final Report

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<b>Location:</b>	Lake Wales, Florida	<b>Accident Number:</b>	ERA15FA277
<b>Date &amp; Time:</b>	July 22, 2015, 10:44 Local	<b>Registration:</b>	N610DA
<b>Aircraft:</b>	CIRRUS DESIGN CORP SR20	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	1 Fatal, 1 Serious
<b>Flight Conducted Under:</b>	Part 91: General aviation - Instructional		

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## Analysis

The flight instructor reported that, during an instructional flight and while demonstrating how to change the route in the GPS, he noticed a "puff" of black smoke appear from under the legs of the pilot receiving instruction. The smoke dissipated quickly, and seconds later, the oil pressure light illuminated, accompanied by an aural warning. The flight instructor took control of the airplane and declared an emergency before diverting to a nearby airport. The flight instructor stated that, while on short final approach for landing, he thought "he was too high and going too fast to make the runway." He could not slow the airplane sufficiently for a safe landing and decided to conduct a go-around; however, when he advanced the throttle, the engine did not respond. When the airplane was about 400 ft above ground level, he instructed the pilot receiving instruction to activate the airframe parachute; however, the parachute did not arrest the descent before the airplane crashed in wooded terrain. The flight instructor was seriously injured, and the pilot receiving instruction was fatally injured.

Postaccident examination of the engine revealed that the oil control rings on all the pistons were stuck. The oil ports on the pistons were clogged, and coking was present. The Nos. 1 through 3 connecting rod bearings showed evidence of the beginning stages of oil starvation. Review of the maintenance logbooks Revealed that during the two months preceding the accident, engine oil consumption increased significantly. It is likely that the engine consumed more oil in the month before the accident due to the stuck oil control rings, which caused the engine case to pressurize and vent oil overboard via the breather tube, consistent with the large amount of oil residue noted on the underside of the fuselage during the wreckage examination. The vented oil also likely resulted in the "puff" of smoke that the instructor saw during the flight. Data downloaded from the airplane's multifunction displays revealed that the oil pressure decreased significantly but that engine power was still available before the accident, indicating that, although the flight instructor stated that the engine did not respond to his throttle input, the engine was operating and producing some power at the time of the accident.

Although the manufacturer did not specify a minimum or maximum altitude for deployment of the airframe parachute, manufacturer-published information indicated that the demonstrated altitude loss from a straight-and-level deployment was 400 ft. The actual altitude loss during any deployment

depended upon the airplane's attitude, altitude, speed, and other environmental factors. The Pilot's Operating Handbook stated that airframe parachute deployment at high speed, low altitude, or in high wind conditions could result in severe injury or death to the aircraft occupants.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A partial loss of engine power due to oil starvation. Contributing was the flight instructor's failure to maintain control of the airplane during an aborted emergency landing, and his delayed decision to deploy the airplane's parachute system.

### Findings

<b>Aircraft</b>	Recip eng oil sys - Malfunction
<b>Aircraft</b>	Oil - Fluid level
<b>Personnel issues</b>	Delayed action - Instructor/check pilot
<b>Personnel issues</b>	Aircraft control - Instructor/check pilot
<b>Aircraft</b>	(general) - Not attained/maintained

## Factual Information

### History of Flight

<b>Enroute</b>	Fire/smoke (non-impact)
<b>Emergency descent</b>	Off-field or emergency landing
<b>Approach</b>	Miscellaneous/other
<b>Approach-VFR go-around</b>	Loss of control in flight (Defining event)
<b>Uncontrolled descent</b>	Collision with terr/obj (non-CFIT)

On July 22, 2015, about 1044 eastern daylight time, a Cirrus SR20, N610DA, was destroyed when it impacted terrain during a go-around at Lake Wales Municipal Airport (X07), Lake Wales, Florida. The flight instructor was seriously injured, and the private pilot receiving instruction was fatally injured. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed for the flight from the Orlando Sanford International Airport (SFB), Sanford, Florida to Page Field Airport (FMY), Fort Myers, Florida. The airplane was operated by Aerosim Flight Academy. The instructional flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

According to the flight instructor, he and the private pilot were in cruise flight at 5,000 feet mean sea level (msl), when air traffic control (ATC) changed their next enroute waypoint due to traffic. As the flight instructor was demonstrating how to change the route in the GPS, they noticed a "puff" of black smoke appear from under the legs of the student pilot. The smoke dissipated quickly and seconds later, the oil pressure light came on with an alarm. The flight instructor took over the flight controls and declared an emergency before diverting to X07. He maintained an altitude of 4,000 feet msl until he had the airport in sight. He made one call on the airport's common traffic advisory frequency reporting "short final for runway 17."

The flight instructor said he was, "too high and going too fast to make the runway." He side-slipped the airplane, but could not get it slowed down enough for a safe landing so he decided to abort the landing and make a 360 degree turn. He advanced the throttle but the engine did not feel like it was generating any power. He saw the adjacent runway, and although a yellow "X" was on runway, he elected to land anyway. He stated the engine lost complete power and about 400 feet above ground level (agl) he told the student pilot to deploy the airplane's emergency parachute. The parachute did not arrest the descent before the airplane entered an aerodynamic stall and crashed in wooded terrain. After the crash the flight instructor telephoned 911 and requested emergency assistance.

According to witnesses at X07, they watched as the airplane approached runway 17. They said that as the airplane reached the runway threshold the pilot appeared to abort the landing before "throttling up" and continuing to fly down the runway. The airplane then made a left turn towards the departure end of runway 6. As the airplane reached the end of the runway, witnesses reported that it seemed "slow and wobbly," before it entered a descending left turn. The witnesses also stated that the airframe parachute was deployed but not fully inflate prior to impact.

## Flight instructor Information

<b>Certificate:</b>	Flight instructor	<b>Age:</b>	33, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	May 14, 2013
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	May 4, 2015
<b>Flight Time:</b>	(Estimated) 1156 hours (Total, all aircraft), 304 hours (Total, this make and model)		

## Student pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	26, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	November 25, 2013
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	May 18, 2015
<b>Flight Time:</b>	(Estimated) 69 hours (Total, all aircraft), 60 hours (Total, this make and model)		

### Flight Instructor

The flight instructor, age 33, held a commercial pilot certificate for airplane single engine, multi-engine land and instrument airplane. His flight instructor certificate had ratings for airplane single-engine, multi-engine, and instrument airplane. The flight instructor's most-recent first class medical certificate was issued in April 2013, was issued without any limitations. According to records provided by the operator, the flight instructor had accumulated about 1,170 total flight hours.

### Private Pilot

The private pilot, age 26, held a private pilot certificate with a rating for airplane single-engine land. He was issued a combined student pilot and first class medical certificate with limitations requiring the use of corrective lenses. A review of the pilot's training records reveal that the pilot took his check ride on April 5, 2015 and received his private pilot certificate on April 13, 2015. A review of his flight training log revealed he accumulated about 70 hours of total flight experience; all of his flight experience in the accident airplane make and model.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	CIRRUS DESIGN CORP	<b>Registration:</b>	N610DA
<b>Model/Series:</b>	SR20	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2007	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	1847
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	July 11, 2015 100 hour	<b>Certified Max Gross Wt.:</b>	3050 lbs
<b>Time Since Last Inspection:</b>	91 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	7124.2 Hrs as of last inspection	<b>Engine Manufacturer:</b>	CONT MOTOR
<b>ELT:</b>	C91 installed, not activated	<b>Engine Model/Series:</b>	IO-360-ES
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	180 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	Pilot school (141)

The airplane was manufactured in 2007. It was powered by a Continental IO-360-ES16B engine rated at 210 horsepower, and was equipped with a Hartzell two-blade constant-speed propeller. The last 100-hour inspection of the airframe and engine occurred on July 11, 2015, at an airframe total time of 6,263.8 hours. As of that inspection the engine had accumulated 2,046 total hours of operation.

According to Continental Motors Service Information Letter SIL 98-9C, the recommended overhaul interval for the engine was 2,200 hours.

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	BOW,124 ft msl	<b>Distance from Accident Site:</b>	9 Nautical Miles
<b>Observation Time:</b>	10:47 Local	<b>Direction from Accident Site:</b>	289°
<b>Lowest Cloud Condition:</b>	Scattered / 2000 ft AGL	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots /	<b>Turbulence Type Forecast/Actual:</b>	/ None
<b>Wind Direction:</b>	250°	<b>Turbulence Severity Forecast/Actual:</b>	/ N/A
<b>Altimeter Setting:</b>	30.02 inches Hg	<b>Temperature/Dew Point:</b>	28°C / 24°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Sanford, FL (SFB )	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Fort Myers, FL (FMY )	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	10:00 Local	<b>Type of Airspace:</b>	

The nearest recorded weather at Bartow Municipal Airport Bartow, Florida (BOW) located 9 nautical miles northwest from the accident site at 1047, included winds from 250 degrees at 7 knots; 10 statute miles visibility, scattered clouds at 2,000 feet, temperature 28 degrees Celsius (C), dew point temperature 24 degrees C, and an altimeter setting of 30.02 inches of mercury.

## Airport Information

<b>Airport:</b>	Lake Wales Airport X07	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	127 ft msl	<b>Runway Surface Condition:</b>	Unknown
<b>Runway Used:</b>		<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	Forced landing;Full stop

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal, 1 Serious	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal, 1 Serious	<b>Latitude, Longitude:</b>	27.892221,-81.611946

Examination of the wreckage was conducted at the accident site, and all major components of the airframe were accounted for at the scene. The wreckage path was oriented on a heading of about 320 degrees magnetic, and was 46 feet in length. Examination of the right wing revealed that it was splintered and the fuel tank was breached. The cockpit was broken away from the fuselage and crushed, and the fuselage displayed crush damage throughout the hull. The empennage was intact and revealed impact damage. The left wing was intact and approximately 12 gallons of fuel were drained from the main tank. Flight control continuity was established from the cockpit controls to all flight control surfaces. A cursory examination of the engine revealed that it was impact-damaged and crushed aft towards the firewall. The propeller was fractured off of the engine crankshaft and located in the debris path approximately 20 feet from the main wreckage. Further examination of the fuselage revealed that the Cirrus Airframe Parachute System (CAPS) was deployed and located 320 degrees magnetic and approximately 226 feet from the main wreckage.

Examination of the engine revealed that it was impact-damaged.. The exhaust pipes were crushed. The rocker covers and top spark plugs were removed, and the cylinders were examined using a lighted borescope. All of the pistons and cylinder domes exhibited normal combustion deposits, and the valves were in place. Further examination of the pistons revealed that the oil ports on the pistons were clogged and coking was present. The oil control rings on all pistons were "stuck." The Nos. 1, 2 and 3 connecting rod bearings showed evidence of incipient oil starvation. Examination of the crankshaft revealed it was broken at the flange where it entered the crankcase halves. The remainder of the crankshaft had continuity when it was rotated. Thumb compression was obtained on all of the cylinders. The camshaft was observed when the oil sump was removed and was coated with oil. The oil sump was removed and examined. The sump was impact damaged and the broken part of the sump that held the oil plug was not located. A small amount of oil was observed in the bottom of the remaining portion of the sump and no metal particles were observed. A large amount of oil residue noted on the belly of the airplane.

The top spark plugs were removed and examined. They exhibited normal wear and had light gray deposits in the electrode areas. The bottom spark plugs were examined with the borescope and they appeared similar to the top spark plugs. The top number one spark plug was broken. An examination of the magnetos revealed a hole was observed in the side of the left magneto. The right magneto was in place and not damaged. Both magnetos sparked at all terminals when the drive shafts were rotated.

Examination of the fuel pump revealed that it was in secure to the engine and impact damaged. The mixture control was still connected and bent to the rear. The drive coupling was not damaged. The drive shaft was free to rotate. The vapor return line was separated, along with the exit line to the metering unit. The unit was disassembled and no internal damage was observed. Examination of the throttle body and

metering unit revealed that it was impact damaged.

The throttle control was free to move. The metering unit was disassembled and no internal damage was observed. The fuel nozzles were in place on the cylinders. Nozzles 2 and 5 were impact damaged. All of the nozzles were clear.

Examination of the accessory case and oil pump revealed that the oil screen was clean, free of debris and coated with oil. The oil pump was in place and the shaft was free to rotate. The pump was disassembled and the pump gears were coated with oil and were not damaged. The oil filter was separated from the engine and not located.

Examination of the propeller revealed that it had separated from the engine during the impact sequence; the engine crankshaft fractured aft of the propeller mounting flange. The propeller assembly with spinner was intact but damaged. Both blades appeared to be resting on the low pitch setting and exhibited noticeable chordwise abrasion in the tip area on the camber side. One blade exhibited an S-bending and twisted leading edge down. Impact marks on one of the blades and on its preload plates indicated the propeller was in the normal operating blade angle range prior to impact.

## **Medical and Pathological Information**

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The Federal Aviation Administration's (FAA) Civil Aerospace Medical Institute performed forensic toxicology on specimens from the flight instructor, with negative results for drugs and alcohol.

Forensic toxicology testing and an autopsy was not performed on the private pilot.

### **TESTS & RESEARCH**

#### **Oil Consumption**

The operator provided a spreadsheet that detailed oil added to engine of the accident airplane since June 1, 2015. Over the month of June, 9 quarts of oil were added and the airplane was flown 67.2 hours. From July 1st until the date of the accident, 17 quarts of oil were added in 68.1 flight hours.

The Continental Motors publication, "Tips on Engine Care" states: "Oil consumption can be expected to vary with each engine depending on the load, operating temperature, type of oil used and condition of the engine. A cylinder differential pressure check and borescope inspection should be conducted if oil consumption exceeds one quart every three hours or if any sudden change in oil consumption is experienced and appropriate action taken."

#### **Non-Volatile Data (NVM)**

According to recovered NVM, the majority of the flight occurred at a pressure altitude of approximately 4,000 feet and engine readings were stable. Fuel flow was about 9.9 gph, manifold pressure (MAP) was about 22.6 inches, and the oil pressure was about 40 psi.



At about 10:33 the airplane climbed to about 4,900 feet pressure altitude. During the climb the fuel flow increased to about 16 gph, the MAP to about 26 inches, and oil pressure ranged from 32-38 psi. At 10:35:24, at 4,900 feet pressure altitude, a reduction in fuel flow is noted that appeared consistent with leaning for cruise flight. Oil pressure was 38 psi at this data point. At 10:35:36, oil pressure was recorded at 24 psi. At 10:35:42, oil pressure was recorded at 8 psi. At 10:35:48, oil pressure was recorded at 3 psi and remained below this value for the remainder of the flight. By 10:36:00, the data was consistent with a power reduction. MAP was at about 11 inches and fuel flow at around 4 gph. At 10:39:30, the data showed an additional power reduction. MAP was about 9 inches or just under 9 for the remainder of the flight and fuel flow was 2.0 to 2.3 gph. The engine monitoring data ended at 10:40:30. When plotted on Google Earth the location for the last data point was about .38 statute miles from the arrival end of runway 17 at a pressure altitude of 257 feet.

### Primary Flight Display (PFD)

PFD data that began after the last multi-function display's engine data log file data point, showed a marked increase in engine percent power, MAP, and engine RPM. The recovered PFD data showed the airplane reached its lowest altitude of approximately 283 feet about a quarter mile north of the arrival end of runway 17. Indicated airspeed at this data point was 106 knots and altitude rate was negative 1,306 feet per minute. At the runway 17 threshold the PFD data indicated the airplane was at approximately 338 feet. Indicated airspeed at this data point was 95 knots and the altitude rate was positive 563 feet per minute. PFD data showed the airplane turned to the left, then a series of roll and pitch oscillations occur prior to impact. The last data point prior to impact showed 22.66 degrees nose down pitch and 99.54 degrees of right roll.

## **Additional Information**

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### Airframe Parachute System

The airplane was equipped with a Cirrus Airframe Parachute System (CAPS). A review of information about the system provided by the manufacturer revealed the demonstrated loss of altitude from a straight and level CAPS deployment was 400 feet agl for the SR20 model. The demonstrated loss of altitude from a 1-turn spin was 920 feet. The altitude loss during a CAPS deployment depended primarily on the direction that the airplane was traveling at the time of deployment.

Section 10 of the Cirrus SR20 pilot operating handbook stated in the "Cirrus Airframe Parachute System Deployment" section:

"The CAPS is designed to lower the aircraft and its passengers to the ground in the event of a life-threatening emergency. However, because CAPS deployment is expected to result in damage to the airframe and, depending upon adverse external factors such as high deployment speed, low altitude, rough terrain or high wind conditions, may result in severe injury or death to the aircraft occupants, its use should not be taken lightly. Instead, possible CAPS activation scenarios should be well thought out

and mentally practiced by every SR20 pilot. The following discussion is meant to guide your thinking about CAPS activation. It is intended to be informative, not directive. It is the responsibility of you, the pilot, to determine when and how the CAPS will be used."

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Alleyne, Eric
<b>Additional Participating Persons:</b>	Ricardo Rodriguez; FAA; Orlando, FL Brad Miller; Cirrus Aircraft; Duluth, MN John Kent; Continental Motors; Mobile, AL Les Doud; Hartzell; Piqua, OH
<b>Original Publish Date:</b>	May 3, 2017
<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=91606">https://data.nts.gov/Docket?ProjectID=91606</a>

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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](#).