Aviation Investigation Final Report

Location:	Danbury, Connecticut	**Accident Number:**	ERA13LA117
Date & Time:	January 22, 2013, 19:25 Local	**Registration:**	N140PG
Aircraft:	CIRRUS DESIGN CORP SR20	**Aircraft Damage:**	Substantial
Defining Event:	Fuel exhaustion	**Injuries:**	3 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The flight instructor was conducting a two-leg, cross-country familiarization flight at night with a private pilot. The flight instructor reported that, before departure, he used a flashlight to look in the airplane's fuel tanks and determined that they contained 25 gallons of usable fuel and that the two flight legs would require 23.3 gallons of fuel. He then entered 22 gallons in the airplane's multifunction display (MFD) fuel totalizer. The airplane reached its destination airport and departed on the return flight without incident; however, shortly after takeoff, the low fuel caution light illuminated. The airplane subsequently experienced a total loss of engine power. The flight instructor deployed the airplane's parachute system, and the airplane subsequently descended into trees about 3 miles northeast of the airport. Postaccident examination of the airplane did not reveal any mechanical malfunctions or failures that would have precluded normal operation, and less than 1 gallon of fuel was drained from the fuel tanks.

The president of the flight school stated that, 2 days before the accident, he had 42 gallons of fuel added to the fuel tanks. He then entered 40 gallons in the airplane's MFD fuel totalizer. He flew two more flights and estimated that the fuel totalizer should have indicated between 14 and 16 gallons before the first leg of the accident flight. Recorded MFD data showed that the total amount of fuel used since the last refueling was 42.4 gallons. The flight instructor likely overestimated the amount of fuel in the airplane before departure and entered the wrong amount into the MFD fuel totalizer, which led to an erroneous display of the actual amount of fuel remaining and his belief that the airplane had sufficient fuel for the flight.

Probable Cause and Findings

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

The flight instructor's inadequate preflight inspection in which he incorrectly estimated the airplane's fuel quantity and his improper reliance on the fuel totalizer rather than the fuel quantity indicating and warning systems to determine the fuel on board, which resulted in a total loss of engine power due to fuel exhaustion.

Findings

Aircraft	Fuel - Inadequate inspection
Personnel issues	Decision making/judgment - Instructor/check pilot
Personnel issues	Fuel planning - Pilot
Aircraft	Fuel - Fluid level

Factual Information

History of Flight

Prior to flight	Preflight or dispatch event
Approach	Fuel exhaustion (Defining event)
Approach	Loss of engine power (total)
Emergency descent	Miscellaneous/other
Emergency descent	Collision with terr/obj (non-CFIT)

On January 22, 2013, about 1925 eastern standard time, a Cirrus Design Corp. SR20, N140PG, operated by Epic Blue Co., was substantially damaged after it deployed its Cirrus Airplane Parachute System (CAPS), while on approach to the Danbury Municipal Airport (DXR), Danbury, Connecticut. The flight instructor, a private pilot, and a passenger were not injured. Visual meteorological conditions prevailed and no flight plan had been filed for the flight that last departed Groton-New London Airport (GON), Groton, Connecticut. The familiarization flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

According to a Federal Aviation Administration (FAA) inspector, the flight instructor and two occupants originally departed from DXR, landed at GON, and were returning to DXR at the time of the accident. The airplane was on approach to runway 26 at DXR, when it experienced a total loss of engine power and the pilot reported that the airplane was "out of fuel" to air traffic control. The flight instructor elected to deploy the CAPS and the airplane subsequently descended via parachute into trees, about 3 miles northeast of the airport. The airplane's empennage separated and the fuselage sustained substantial damage.

The flight instructor reported that he was providing the private pilot Cirrus training and familiarization. He determined that the airplane had 25 total gallons of useable fuel onboard during a preflight inspection, by utilizing a flashlight to visually observe that the fuel level was "slightly below the tabs" in the right fuel tank, and "at the tabs" in the left fuel tank, prior to departing from DXR and noted that the required fuel for the round trip flight, which included taxi and reserve fuel was 23.3 gallons. He then entered "22 gallons" in the airplane's electronic fuel monitor. The flight subsequently landed at and departed from GON without incident, for a planned 38-minute return flight to DXR. During the initial climb, the flight instructor noticed a "High Fuel Flow" advisory warning for about 10 seconds. He reduced engine power until the light extinguished, climbed to 4,500 feet, and continued to DXR.

About 12 miles from DXR, the "FUEL" quantity annunciator light illuminated. The airplane was about 8 to 10 miles from DXR, when the engine experienced a total loss of the engine power. The flight instructor was able to restart the engine momentarily on two occasions; however, after the engine quit for the third time, and the airplane descended to about 1,000 feet mean sea level, he deployed CAPS.

The private pilot reported that he had no previous flight experience in Cirrus aircraft. The fuel level observed during the preflight inspection at DXR with the flight instructor was "one finger below the tabs." After landing at GON the fuel selector was positioned to from the left tank which indicated below "1/8th", to the right fuel tank which indicated "5/8ths." He further stated that the fuel warning light on the left side of the primary flight display illuminated shortly after takeoff. When the airplane was about 18 miles east of DXR, he observed the right fuel gauge "bouncing" at one-half and mentioned landing at a nearby airport in Oxford or New Haven, Connecticut. The flight instructor indicated that there was no need to land based on the multi-function-display (MFD), which indicated there would be almost 1 hour of fuel remaining after landing at DXR. He further noted that the indicated fuel flow during cruise flight was 9 gallons per hour.

Examination of the airplane by an FAA inspector did not reveal any visible fuel in the airplane's fuel tanks, nor were there any indications of a fuel spill at the accident site. After the airplane was recovered, approximately 26 ounces of fuel was drained from the airplane's fuel system. Subsequent inspection of the airplane by representatives of the airframe and engine manufacturer, under the supervision of an FAA inspector did not reveal any preaccident mechanical malfunctions or failures that would have precluded normal operation. An undetermined amount of additional fuel drained from the airplane; however, the total fuel drained was less than 1 gallon. All fuel sump valves worked correctly and displayed no evidence of leaking. About 1 minute after the avionics power switch was turned on; the "FUEL" warning light illuminated and remained on. The avionics power switch was turned off, and 10 gallons of 100-low-lead aviation fuel was added to the left fuel tank. When the avionics switch was turned back on, the "FUEL" warning light remained off and the left fuel gauge indicated 10 gallons present in the tank. In addition, there was no evidence of any fuel leaks when the electric boost pump was operated.

According to the President of Epic Blue Co., who was also a flight instructor, he conducted an uneventful training flight in the accident airplane on January 20th. After the flight, he ensured that that both fuel tanks were refilled to "tabs plus 8 gallons," which equated to 42 total gallons, 21 per side. He then set the fuel totalizer on the airplane's MFD to 40 gallons, to allow for a safety margin and conducted an uneventful flight that lasted .7 tach hours and 1.1 Hobbs hours. The following day, he flew to Martha's Vineyard, landed and then returned to DXR. The flights totaled 2 tach hours, and 3.1 Hobbs hours. He did not recall the amount of fuel remaining on the fuel totalizer after the flight; however, he recalled it showed 16 gallons remaining while on approach to land, about 7 miles from the airport. He estimated that the fuel totalizer would have indicated somewhere between 14 to 16 gallons at the end of the flight. In addition, he reported that the accident pilot told him after the accident that the fuel level was "…slightly under tabs on one side, and a bit more than that (under the tabs) on the other side."

The four-seat, low-wing, fixed-gear airplane, serial number 1920, was manufactured in 2008. It was constructed primarily of composite material, and equipped with a Teledyne Continental Motors IO-360-ES, 200-horsepower engine. At the time of the accident, the airplane and engine had been operated for about 90 hours since its most recent annual inspection, which was performed on October 16, 2012.

Review of the pilot's operating handbook (POH) revealed that airplane's total fuel capacity was 60.5 gallons, with 56 gallons noted as "usable." The airplane was equipped with an amber "FUEL" caution light in the annunciator panel located on the left side of the instrument panel, which would activate if the

fuel quantity in both tanks dropped below 8.5 gallons. In addition, in the event fuel flow exceeded 18 gallons per hour, the MFD would display "Check Fuel Flow" in a red advisory box in the lower right corner of the MFD. Cirrus did not provide any guidance in the POH in the event of a high fuel flow indication.

The airplane was equipped with an Avidyne MFD that was capable of recording engine and airplane performance data to a compact flash card. The compact flash card was removed and successfully downloaded at the NTSB's Vehicle Recorder Division, Washington, DC. The data recorded included the fuel used over time for a given flight. The total amount of fuel used since the last reported refueling was 42.4 gallons. In addition, review of the recorded data did not reveal any anomalies that were consistent with the flight instructor's report of a high fuel flow indication. Recorded fuel flows were observed in the normal operating range.

The flight instructor reported 471 hours of total flight experience, which included 120 in the same make and model as the accident airplane, and 40 hours during the 90 days that preceded the accident.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	23
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	January 12, 2012
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	November 21, 2012
Flight Time:	471 hours (Total, all aircraft), 120 hours (Total, this make and model), 40 hours (Last 90 days, all aircraft)		

Pilot Information

Certificate:	Private	**Age:**	32
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	August 12, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	116 hours (Total, all aircraft), 0 hours (Total, this make and model), 9 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N140PG
Model/Series:	SR20	**Aircraft Category:**	Airplane
Year of Manufacture:	2008	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1920
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	October 16, 2012 Annual	**Certified Max Gross Wt.:**	2900 lbs
Time Since Last Inspection:	90 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1665 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-360-ES
Registered Owner:	Kenyon Flight LLC.	**Rated Power:**	200 Horsepower
Operator:	Epic Blue Co.	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	DXR,457 ft msl	**Distance from Accident Site:**	4 Nautical Miles
Observation Time:	19:22 Local	**Direction from Accident Site:**	80°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots / 16 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.09 inches Hg	**Temperature/Dew Point:**	-10°C / -23°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Groton, CT (GON)	**Type of Flight Plan Filed:**	None
Destination:	Danbury, CT (DXR)	**Type of Clearance:**	None
Departure Time:	18:45 Local	**Type of Airspace:**	

Airport Information

Airport:	Danbury DXR	**Runway Surface Type:**	Asphalt
Airport Elevation:	456 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	26	**IFR Approach:**	None
Runway Length/Width:	4421 ft / 150 ft	**VFR Approach/Landing:**	Forced landing;Straight-in

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	41.388053,-73.429725(est)

Administrative Information

Investigator In Charge (IIC):	Schiada, Luke
Additional Participating Persons:	Barry Donahue; FAA/FSDO; Windsor Locks, CT Bradley Miller; Cirrus Aircraft; Duluth, MN John Kent; Continental Motors, Inc.; Mobile, AL
Original Publish Date:	July 30, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=86065