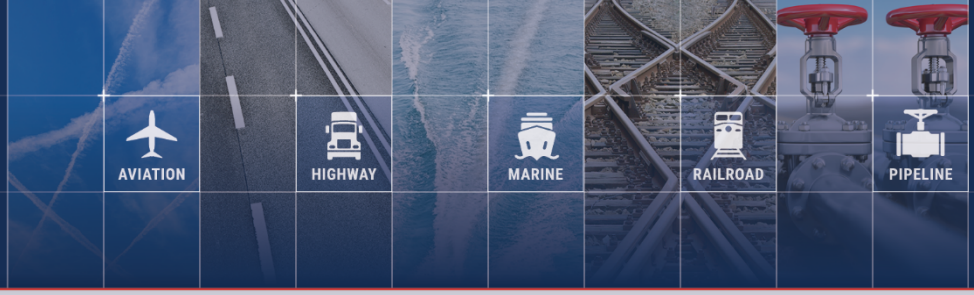

Aviation Investigation Final Report

Location:	Sebring, Florida	**Accident Number:**	ERA09FA087
Date & Time:	December 13, 2008, 12:06 Local	**Registration:**	N99154
Aircraft:	Ercoupe 415-D	**Aircraft Damage:**	Substantial
Defining Event:	Aircraft structural failure	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Witnesses observed the accident airplane as it performed a low-level, local flight in the vicinity of the passenger's home. The witnesses reported that the airplane entered a high-speed dive before pulling up and rolling steeply left. One of the witnesses reported that both ailerons were "fluttering" just before both wings separated from the fuselage and the airplane broke up. Examination of the wreckage revealed that the wing spar failed in overload at its center, in an aft and downward direction. Though a hole not specified in the design of the airplane was present at the point where the separation of the spar began, its effect on the preaccident structural strength of the spar could not be determined. No corrosion or evidence of a fatigue failure was observed in the vicinity of the initial separation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's exceedance of the design stress limitations of the airplane.

Findings

Aircraft	Spar (on wing) - Capability exceeded
Personnel issues	Decision making/judgment - Pilot

Factual Information

History of Flight

Maneuvering	Aircraft structural failure (Defining event)

HISTORY OF FLIGHT

On December 13, 2008 at 1206 eastern standard time, an Ercoupe 415-D, N99154, was destroyed during an in-flight breakup near Sebring, Florida. The certificated commercial pilot and the passenger were fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight, which departed Avon Park Executive Airport (AVO), Avon Park, Florida about 1115. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

According to a friend of the accident pilot, who was also a certificated aircraft mechanic, he and the pilot flew together in the accident airplane on a local sightseeing flight immediately prior to the accident flight. The friend did not note any abnormalities with the performance of either the airplane or the pilot during their flight, and upon returning to AVO, the friend disembarked the airplane and the accident passenger boarded.

Numerous witnesses observed the airplane flying in the local area around the time of the accident. One witness was outside talking with a neighbor when he observed the airplane flying overhead. The airplane was initially flying southwest, and made a "very slight dip and turned to the right. Then the airplane pulled up severely and started turning to the left." As the airplane continued upward and banked to the left, something "shiny" exited from the tail area of the airplane. The witness remarked to his neighbor, "What the heck is he dumping," and the airplane then began to break apart. The witness added that he did not hear any type of explosion and did not observe any smoke or fire.

Another witness, who was also a certificated airline transport pilot, stated that while outside working on his house he observed the accident airplane flying overhead. He estimated that the airplane was flying at an altitude about 1,200 feet above ground level, and did not note anything abnormal about its flight path. About 45 minutes after first seeing the airplane, he heard an abnormal engine sound that diverted his attention again back to it.

The witness stated that the engine sound was smooth, continuous, and sounded as if the engine was being "over-sped," as if the engine were at full power and the airplane was in a high speed dive. When he looked up, he saw the airplane pitching up and rolling into a steep left bank, and initially thought that the pilot was attempting to perform a "barrel-roll or a slow roll." From his position, he could see the bottom of the airplane, as well as both wings, as the airplane traveled north. He additionally noted that while the airplane was banking, both ailerons

were "fluttering" at a high frequency. The bank angle increased to almost 90 degrees, when the left wing of the airplane "folded back" and separated from the fuselage. The airplane then pivoted about the lateral axis 90 degrees, and the right wing then separated from the fuselage along with a portion of the cabin. The wings “fluttered” or "twirled" to the ground, while the portion of the cabin continued forward and down to the ground. He recalled hearing three distinct "thuds" as the pieces of the airplane impacted the ground.

The witness also reported that during the breakup the airplane released what initially looked like “confetti,” which he later determined to be painted chips of dope from the airplane’s fabric covered wings.

METEOROLOGICAL INFORMATION

The weather conditions reported at Bartow Municipal Airport (BOW), Bartow, Florida, located about 24 nautical miles west of the accident site, at 1152, included winds from 020 degrees at 9 knots, gusting to 15 knots, 20 statute miles visibility, clear skies, a temperature of 16 degrees Celsius (C), a dewpoint of 6 degrees C, and an altimeter setting of 30.21 inches of mercury.

PERSONNEL INFORMATION

The pilot, age 70, held a commercial pilot certificate with ratings for airplane single engine land and sea, airplane multiengine land, and instrument airplane. He also held a flight instructor certificate with ratings for airplane single engine, airplane multiengine, and instrument airplane. His most recent FAA second class medical certificate was issued on June 2, 2008.

Examination of the pilot’s most recent logbook, which began on May 3, 2001, revealed that he had logged 7,126 total hours of flight experience, 12 hours of which were in the accident airplane make and model.

AIRCRAFT INFORMATION

According to records provided by the FAA, the accident airplane was manufactured in 1946. According to maintenance records, the airplane’s most recent annual inspection was completed on May 9, 2008. At the time of the inspection, the airplane had accumulated 2,588 total hours of operation.

WRECKAGE AND IMPACT INFORMATION

The in-flight breakup occurred over a residential community built around a golf course, and was the same community where the passenger resided. Portions of wreckage were found along a wreckage path that was 3,100 feet long, and oriented on a magnetic heading about 020 degrees. The first pieces of wreckage, found at the most southern end of the wreckage path, included both aft cabin windows. Paint chips, inspection panels, and various personal effects from inside the airplane were located further along the wreckage path, with the right

wing being the next most substantial component located.

The right wing was located about 2,000 feet from the aft cabin windows, along the wreckage path. The wing was lodged in the ground, oriented perpendicular to the terrain. The wing remained largely intact, and was separated from the fuselage at the wing root, just inboard of the leading edge fuel tank. The wing spar remained intact to a point about 1-foot inboard of the wing root, where it separated from the remainder of the airplane's structure. Ten of the right wing's 17 inspection port covers were dislodged, and located at various points along the wreckage path in an inverted, or "popped" position. All of the displaced covers had, with one exception, come from the wing root, leading edge, and outboard edge, while the inspection covers from the center and trailing edge portions remained in place.

The left wing was located about 900 feet beyond the right wing, along the wreckage path. The left wing spar was fractured at a similar location as the right wing spar. Several of the inspection port covers were dislodged, but did not display any discernable pattern as was observed on the right wing. The inboard portions of both wing spars were forwarded to the Safety Board Materials Laboratory for further examination.

The main portion of wreckage came to rest about 200 feet beyond the left wing, along the wreckage path. The nose, cabin, and aft portion of fuselage exhibited extensive crush damage, and its entirety was contained with an area about 10 by 10 feet. The cabin was severely compromised, and the seat pan, where both occupants were located, was found about 125 feet north of the main wreckage. The empennage, horizontal and vertical stabilizers remained largely intact, but separated from the remainder of the fuselage, and was co-located with the main wreckage. The propeller was lodged in a shallow impact crater, and remained attached to the engine at the propeller flange. Chordwise scratching and burnishing was present on both blades.

Aileron and rudder control continuity was traced from the flight control surfaces to the control "mixing" bellcrank, normally located just aft of the main spar carrythrough. Separations of the aileron control push-pull tubes were noted at both wing roots, and the elevator push-pull tube was separated about 1-foot forward its bellcrank.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Office of the District Medical Examiner, Winter Have, Florida. The autopsy report noted the cause of death as "blunt impact."

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing on the pilot. No traces of carbon monoxide, cyanide, ethanol, or drugs were detected.

ADDITIONAL INFORMATION

The inboard portions of both separated portions of the wing spar were examined in the Safety Board Materials Laboratory. According to the Materials Laboratory report, the deformation to the top spar cap and the appearance of the fracture surfaces along the centerline of the main spar were consistent with ductile overstress in an aft and downward bending of the center wing spar.

Examination of the fracture surfaces revealed an apparent modification to the top spar cap that reduced the cross-sectional area by 10-percent. Three screw holes were observed in the spar cap with the tip of a broken self-tapping screw still in one of the holes. According to information provided by the airframe manufacturer, two screw holes, spaced 1-inch apart, oriented longitudinally across the spar (fore and aft), were specified in the original design of the airplane (to fasten the seat pan to the spar). The broken self-tapping screw was found in the forward-most of these two holes. The third hole, not specified in the design, was located in-between and less than 1 inch from the other holes, and was threaded for a larger size than the other two holes.

The fracture surface on the top spar cap contained radial lines emanating from the screw holes, shear lips at the edges, and necking at the edges consistent with tensile overstress in the top spar cap. There was no evidence of fatigue. The radial lines from the aft screw hole emanated from the top surface of the spar cap. The radial lines on the forward portion of the fracture surface appeared to originate near the tip of the broken screw. The appearance of the aft portion of the fracture surface was consistent with crack face re-contact on both left and right fracture faces.

Markings on the fractures on the top and bottom spar caps were consistent with an initial break at the center of the top spar that progressed outboard. Additional damage noted on both sections of the spar was consistent with ground impact. No evidence of corrosion was observed on any portion of the wing spar.

Pilot Information

Certificate:	Commercial	**Age:**	70,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	June 2, 2008
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	May 3, 2007
Flight Time:	7126 hours (Total, all aircraft), 12 hours (Total, this make and model), 6998 hours (Pilot In Command, all aircraft), 3 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Ercoupe	**Registration:**	N99154
Model/Series:	415-D	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1777
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	May 9, 2008 Annual	**Certified Max Gross Wt.:**	1260 lbs
Time Since Last Inspection:		**Engines:**	1
Airframe Total Time:	2588 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, not activated	**Engine Model/Series:**	C85 SERIES
Registered Owner:	On file	**Rated Power:**	85 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	BOW,125 ft msl	**Distance from Accident Site:**	24 Nautical Miles
Observation Time:	11:52 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Clear	**Visibility**	20 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / 15 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	20°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.2 inches Hg	**Temperature/Dew Point:**	16°C / 6°C
Precipitation and Obscuration:			
Departure Point:	Avon Park, FL (AVO)	**Type of Flight Plan Filed:**	None
Destination:	Avon Park, FL (AVO)	**Type of Clearance:**	None
Departure Time:	11:15 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	27.478889,-81.508331

Administrative Information

Investigator In Charge (IIC):	Diaz, Dennis
Additional Participating Persons:	Robert Potts; FAA/FSDO; Orlando, FL
Original Publish Date:	March 3, 2010
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=69559