



Aviation Investigation Final Report

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|--------------------------------|--------------------------------------|-------------------------|-----------------|
| Location: | Fayetteville, Arkansas | Accident Number: | CEN16LA026 |
| Date & Time: | November 3, 2015, 09:50 Local | Registration: | N857SW |
| Aircraft: | CIRRUS DESIGN CORP SR22T | Aircraft Damage: | Substantial |
| Defining Event: | Loss of engine power (total) | Injuries: | 3 Minor, 1 None |
| Flight Conducted Under: | Part 91: General aviation - Personal | | |

Analysis

During the enroute climb to cruise altitude, the low oil pressure warning light activated. The pilot notified air traffic control, received vectors to the nearest airport, and began a descent as the oil pressure continued to decrease. About 3 miles from the airport, the engine experienced a total loss of power. The pilot could not see the airport or runway due to a cloud layer below and elected to deploy the airplane parachute system. The airplane descended under canopy to a four-lane road, where a car impacted the left wing. A postaccident examination of the engine revealed a fatigue fracture of the oil cooler cross fitting, which resulted in oil starvation, internal damage to the crankcase, and a subsequent total loss of engine power.

About four months before the accident, the engine manufacturer released a critical service bulletin (CSB) for a known problem pertaining to the oil cooler cross fitting assembly. Although the airplane underwent scheduled maintenance about a month before the accident, the CSB was not completed due to time constraints. Although compliance was not mandatory, it is likely that the accident would have been prevented had the CSB been completed.

Probable Cause and Findings

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

The fatigue failure of the oil cooler cross fitting, which resulted in engine oil starvation and a total loss of engine power.

Findings

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| Aircraft | Recip eng oil sys - Failure |
| Aircraft | Recip eng oil sys - Design |
| Aircraft | Recip eng oil sys - Not serviced/maintained |

Factual Information

History of Flight

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| Enroute | Loss of engine power (total) (Defining event) |
| Emergency descent | Off-field or emergency landing |
| Emergency descent | Powerplant sys/comp malf/fail |
| Enroute | Powerplant sys/comp malf/fail |

On November 3, 2015, at 0950 central standard time, a Cirrus SR22T airplane, N857SW, experienced a total loss of engine power, descended under the canopy of the Cirrus Airframe Parachute System (CAPS) and landed on a road in Fayetteville, Arkansas. The private rated pilot, pilot rated passenger and one person on the ground received minor injuries. The passenger in the right rear seat was uninjured. The airplane sustained substantial damage. The airplane was registered to WG Aviation LLC, Rogers, Arkansas, and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident and an instrument flight rules (IFR) flight plan was filed. The flight departed from Bentonville Municipal Airport (VBT), Bentonville, Arkansas, at 0934 and was en route to Waco Regional Airport (ACT), Waco, Texas.

According to the pilot, after departure from VBT he leveled off around 10,000 ft mean sea level (msl) and was above a cloud layer. The pilot noticed that the crew alerting system (CAS) flashed an amber caution light for oil pressure and the engine was still producing normal power. The pilot notified air traffic control (ATC) of the oil pressure issue and received vectors to the nearest airport, Drake Field Airport (FYV), Fayetteville, Arkansas. The pilot descended and maneuvered toward FYV as the CAS illuminated a red warning light for oil pressure, which had dropped below 10 psi. The engine was producing inconsistent power as the airplane descended to 3,300 ft msl. The pilot notified ATC that he could not maintain altitude and ATC declared an emergency on his behalf. About 3 miles from FYV the airplane was still above the cloud layer and he could not see the airport or runway. The airplane slowed to 80 knots around 1,000 ft above ground level (agl) and the stall warning horn sounded. He deployed the CAPS and the airplane descended to the ground under the canopy. The landing was very firm and the seatbelt airbags deployed.

Pilot Information

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|----------------------------------|--|--|-------------------|
| Certificate: | Private | Age: | 56, Male |
| Airplane Rating(s): | Single-engine land | Seat Occupied: | Left |
| Other Aircraft Rating(s): | None | Restraint Used: | 4-point |
| Instrument Rating(s): | Airplane | Second Pilot Present: | Yes |
| Instructor Rating(s): | None | Toxicology Performed: | No |
| Medical Certification: | Class 3 Without waivers/limitations | Last FAA Medical Exam: | February 28, 2014 |
| Occupational Pilot: | No | Last Flight Review or Equivalent: | August 16, 2015 |
| Flight Time: | 572 hours (Total, all aircraft), 175 hours (Total, this make and model), 349 hours (Pilot In Command, all aircraft), 31 hours (Last 90 days, all aircraft), 19 hours (Last 30 days, all aircraft), 0.5 hours (Last 24 hours, all aircraft) | | |

Pilot-rated passenger Information

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| Certificate: | Airline transport; Flight instructor | Age: | 47, Male |
| Airplane Rating(s): | Single-engine land; Multi-engine land | Seat Occupied: | Right |
| Other Aircraft Rating(s): | None | Restraint Used: | 4-point |
| Instrument Rating(s): | Airplane | Second Pilot Present: | Yes |
| Instructor Rating(s): | Airplane single-engine; Instrument airplane | Toxicology Performed: | No |
| Medical Certification: | Class 1 With waivers/limitations | Last FAA Medical Exam: | July 20, 2015 |
| Occupational Pilot: | Yes | Last Flight Review or Equivalent: | |
| Flight Time: | | | |

Passenger Information

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|----------------------------------|----|--|---------|
| Certificate: | | Age: | Male |
| Airplane Rating(s): | | Seat Occupied: | Right |
| Other Aircraft Rating(s): | | Restraint Used: | 3-point |
| Instrument Rating(s): | | Second Pilot Present: | Yes |
| Instructor Rating(s): | | Toxicology Performed: | No |
| Medical Certification: | | Last FAA Medical Exam: | |
| Occupational Pilot: | No | Last Flight Review or Equivalent: | |
| Flight Time: | | | |

The pilot, age 56, held a private pilot certificate with ratings for airplane single engine land and instrument airplane. On February 26, 2014, the pilot was issued a third class medical certificate with no limitations listed.

The pilot rated passenger, age 47, held an airline transport pilot certificate. He also held a flight instructor certificate for single engine airplane and instrument airplane. On July 20, 2015, he was issued a first class medical certificate with one limitation: must wear corrective lenses.

Aircraft and Owner/Operator Information

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|--------------------------------------|--|---------------------------------------|--------------------|
| Aircraft Make: | CIRRUS DESIGN CORP | Registration: | N857SW |
| Model/Series: | SR22T | Aircraft Category: | Airplane |
| Year of Manufacture: | 2014 | Amateur Built: | |
| Airworthiness Certificate: | Normal | Serial Number: | 0816 |
| Landing Gear Type: | Tricycle | Seats: | 4 |
| Date/Type of Last Inspection: | September 30, 2015 Continuous airworthiness | Certified Max Gross Wt.: | |
| Time Since Last Inspection: | 27.5 Hrs | Engines: | 1 Reciprocating |
| Airframe Total Time: | 232.4 Hrs as of last inspection | Engine Manufacturer: | Continental Motors |
| ELT: | Installed | Engine Model/Series: | TSIO-550-K |
| Registered Owner: | On file | Rated Power: | 315 Horsepower |
| Operator: | On file | Operating Certificate(s) Held: | None |

The Cirrus SR22T four seat, low wing, fixed tricycle landing gear airplane, serial number 0816, was manufactured in 2014. The airplane was powered by a 315-horsepower, turbocharged, Continental Motors TSIO-550-K engine, which drove a 3-bladed, composite, constant speed Hartzell propeller.

A review of the airplane logbooks revealed that a 50 hour engine inspection was completed on September 30, 2015, at a total time of 232.4 hours and Hobbs meter time of 288.9 hours.

A maintenance work order, opened September 24, 2015, and closed October 7, 2015, revealed under discrepancy 6 to comply with Continental Motors Critical Service Bulletin CSB15-2 – Oil Cooler Cross Fitting Replacement. The maintenance was deferred to a later date because the "owner was out of time to wait and requested" to complete the CSB during the next maintenance service. The work order also noted that the CSB was deferred due to the engine manufacturer being out of stock of oil cooler cross fittings. According to the maintenance facility inventory report, four oil cooler cross fittings were received from the engine manufacturer on September 29, 2015, immediately after they were back in stock. The pilot had already decided to defer this CSB, therefore it was not completed.

Meteorological Information and Flight Plan

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| Conditions at Accident Site: | Visual (VMC) | Condition of Light: | Day |
| Observation Facility, Elevation: | KFYV,1259 ft msl | Distance from Accident Site: | 3 Nautical Miles |
| Observation Time: | 09:53 Local | Direction from Accident Site: | 175° |
| Lowest Cloud Condition: | Clear | Visibility | 10 miles |
| Lowest Ceiling: | None | Visibility (RVR): | |
| Wind Speed/Gusts: | 9 knots / 17 knots | Turbulence Type Forecast/Actual: | / |
| Wind Direction: | 190° | Turbulence Severity Forecast/Actual: | / |
| Altimeter Setting: | 30.11 inches Hg | Temperature/Dew Point: | 16°C / 14°C |
| Precipitation and Obscuration: | No Obscuration; No Precipitation | | |
| Departure Point: | BENTONVILLE, AR (VBT) | Type of Flight Plan Filed: | IFR |
| Destination: | WACO, TX (ACT) | Type of Clearance: | IFR |
| Departure Time: | 09:34 Local | Type of Airspace: | Class C;Class D;Class E |

At 0953, the weather observation at FYV recorded wind from 190 at 9 knots, gusting to 17 knots, 10 miles visibility, clear sky, temperature 61° F, dew point 57° F, and altimeter setting 30.11 inches of mercury.

Airport Information

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| Airport: | DRAKE FIELD FYV | Runway Surface Type: | Asphalt |
| Airport Elevation: | 1252 ft msl | Runway Surface Condition: | Unknown |
| Runway Used: | 16 | IFR Approach: | None |
| Runway Length/Width: | 6005 ft / 100 ft | VFR Approach/Landing: | Forced landing;Straight-in |

Wreckage and Impact Information

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|----------------------------|-----------------|-----------------------------|---------------------------|
| Crew Injuries: | 1 Minor | Aircraft Damage: | Substantial |
| Passenger Injuries: | 1 Minor, 1 None | Aircraft Fire: | None |
| Ground Injuries: | 1 Minor | Aircraft Explosion: | None |
| Total Injuries: | 3 Minor, 1 None | Latitude, Longitude: | 36.056667,-94.174446(est) |

The airplane landed on the east bound side of a four lane road in Fayetteville, Arkansas. The airplane impacted a moving vehicle, then a curb, and came to rest on the sidewalk with the nose facing east. The

left landing gear had partially collapsed outward, the right landing gear was separated, and the nose landing gear had collapsed and separated. The left wing sustained leading edge damage near the wing tip. The right wing sustained damage to the leading edge near the wing root. The bottom of the fuselage was damaged. A black oily residue was observed from the bottom of the fuselage to the bottom tip of the rudder. The parachute was found on the ground behind the airplane.

A postaccident examination was conducted on November 4, 2015. During the examination there was no evidence of a breach in the crankcase or the oil sump; however, the nipple fitting that connected to the oil cooler cross fitting was separated and oil residue was observed in the engine compartment. The top spark plugs were removed and found to be in "normal condition" when compared to a Champion Aviation Check-A-Plug AV-27 chart. However, each of the top spark plugs exhibited a dark, sooty coloration indicative of a rich fuel air mixture. Each of the six cylinders were examined with a lighted borescope. The intake and exhaust valves were intact with normal coloration and combustion signatures. The damaged propeller was manually rotated revealing that the internal engine components were "tight" and not easily rotated. The oil dipstick was removed and the engine oil level appeared to be 1 to 2 quarts. All fuel system components remained intact and attached to the engine. The magnetos remained intact and in place with no apparent impact damage. All other engine accessories were intact and unremarkable.

Engine Examination and Disassembly

The engine was disassembled at the engine manufacturer's facility on November 23, 2015, under the supervision of the NTSB. The examination revealed that the nipple fitting that connected to the oil cooler cross fitting had fractured. The cross fitting had several tool marks on the flat sides of the part. The engine exhibited mechanical damage signatures on all rod and main bearing journals. The Nos. 1 and 3 rods had released from the crankshaft and internal damage to the interior of the crankcase was noted. The oil pump was examined and there was no indication of hard particle passage noted. The oil sump contained metal fragments of the rod bearings from the released connecting rods. The remainder of the engine exhibited normal operating signatures, with the exception of the mechanical and thermal damage.

Tests and Research

Metallurgy Testing

The fractured nipple fitting surface was examined by the engine manufacturer's metallurgy laboratory. The examination revealed that the part separated in fatigue, which initiated at a thread root at the assembled intersection of the pipe nipple and bushing.

Additional Information

Recorded Flight Data – Cirrus Recoverable Data Module

The airplane's recoverable data module (RDM) was removed and sent to the NTSB Vehicle Recorders Laboratory for download. The data revealed that the airplane departed and climbed at a constant speed with the oil pressure indicating about 50 psi. At 0943:30, as the airplane was climbing through 9,500 ft msl, the oil pressure began to decrease. The airplane reached a peak altitude of 9,830 ft msl. At 0944 the oil pressure had decreased to 36 psi and the airplane made a left turn and started to descend. The airplane descended for about 7 minutes as the oil pressure decreased about 0.5 psi per second until it reached about 3 psi. Engine RPM decreased to 0 as oil pressure decreased below 1 psi at 0950:30.

Continental Motors Critical Service Bulletin CSB15-2 – Oil Cooler Cross Fitting Replacement

The CSB15-2 was originally published on July 2, 2015, and the purpose was to replace the old oil cooler cross fitting with a new enhanced cross fitting within the next 25 hours of engine operation or the next scheduled inspection or engine servicing, whichever occurred first." The bulletin noted "compliance necessary to maintain safety" and further stated "Continental Motors, Inc. (CMI) is aware of some occurrences in which there was a loss of engine oil due to a fractured nipple fitting that connects the cross fitting to the pipe bushing at the oil cooler. Design improvements consolidate the oil cooler cross fitting stack-up into a single part, which significantly increases the strength and provides a simplified installation procedure for installing the oil cooler cross fitting found on specified TSIO-550 and TSIOF-550 engines."

CSB15-2A – The bulletin was revised on October 30, 2015, with updated warranty information and updated illustrated parts catalog instructions.

CSB15-2B – As a result of this accident investigation the bulletin was revised on November 6, 2015, to update the engine models affected.

Continental Motors Critical Service Bulletin CSB15-7 – Oil Cooler Cross Fitting Replacement

CSB15-7 – As a result of this accident investigation another critical service bulletin was issued on November 6, 2015. This bulletin was essentially the same as CSB15-2B, but was issued specifically for the accident engine model, TSIO-550-K. Additionally, the compliance time was updated from CSB15-2B and stated "Prior to further flight. A maximum of 5 hours flight time is authorized for aircraft repositioning in order to comply with this bulletin."

CSB15-7A – As a result of this accident investigation this bulletin was revised on November 10, 2015, to include specific engine serial numbers affected.

CSB15-7B – As a result of this accident investigation this bulletin was revised on April 26, 2016, with an updated compliance time which stated "Prior to further flight. A maximum of 5 hours flight time is authorized for aircraft repositioning in order to comply with this bulletin. An alternative method of compliance for hose and connection fittings may be available from the airframe manufacturer. Contact the airframe manufacturer for compliance alternatives under their authority."

Cirrus Aircraft Service Advisory SA15-04

Cirrus issued service advisories following the release of Continental Motors CSB15-2 and CSB15-7, informing Cirrus SR22T customers of the CSBs and issued mandatory compliance times.

Federal Aviation Administration regulations do not require compliance with service bulletins for aircraft operating under the provisions of 14 Code of Federal Regulations Part 91.

Administrative Information

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| Investigator In Charge (IIC): | Lindberg, Joshua |
| Additional Participating Persons: | Brian Love; FAA; Little Rock, AR Mike Council; Continental Motors; Mobile, AL Brannon Mayer; Cirrus Aircraft; Duluth, MN |
| Original Publish Date: | December 12, 2016 |
| Last Revision Date: | |
| Investigation Class: | Class |
| Note: | The NTSB did not travel to the scene of this accident. |
| Investigation Docket: | https://data.nts.gov/Docket?ProjectID=92272 |

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

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](#).