Aviation Investigation Final Report

Location:	Bloomfield, New Mexico	**Accident Number:**	CEN17LA030
Date & Time:	October 28, 2016, 09:54 Local	**Registration:**	N234PJ
Aircraft:	CIRRUS DESIGN CORP SR22	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a cross-country personal flight. He reported that, during cruise flight, the engine starting "missing" and that, within 2 minutes, lost all power. His attempts to restore engine power were not successful. He was unable to locate a suitable forced landing site within the airplane's glide range, so he chose to activate the ballistic parachute system. The aft fuselage separated from the airframe during the accident sequence. The airplane came to rest in an area of low brush and small trees.

Postaccident engine examination revealed that the fuel port cap was not installed on the throttle body metering unit. The cap was subsequently found in the cylinder baffling immediately below the metering unit. Both the fitting and the cap appeared to be undamaged. The cap was subsequently reinstalled, and an engine test run was conducted with no anomalies noted.

Data downloaded from the airplane's onboard avionics indicated that the engine speed and fuel flow were stable for the initial portion of the flight. However, about 45 minutes into the flight, the engine speed and fuel flow decayed abruptly, and the airplane entered a gradual descent. The engine speed did not recover during the rest of the flight. Before the loss of engine power, the fuel flow initially decreased from about 18.0 gallons per hour (gph) to 9.9 gph, before increasing to about 30.0 gph after the loss of power.
Examination of the fuel system revealed that the fuel flow transducer was installed between the fuel pump/mixture control and the throttle body metering unit, which was upstream in the fuel flow relative to the fuel port fitting. The loss of the fuel port cap would have allowed unrestricted fuel flow into the engine compartment. The transducer would have continued to measure fuel flow passing through the unit even though that fuel was ultimately not reaching the engine because it was installed upstream to the fuel port fitting. Further, the increased fuel flow measured after the loss of engine speed was consistent with an availability of fuel, a functioning fuel pump, and the mixture control being at or near the full-rich position.

Maintenance records revealed that, about 3 weeks before the accident, the engine's fuel nozzles were

replaced, followed by an operational flight check and a ground run, to verify that the fuel system setting was in accordance with the Engine Maintenance and Overhaul Manual. The manual specified that the fuel port cap needed to be removed to connect external fuel pressure gauges and then reinstalled once testing and necessary fuel system adjustments were completed. The airplane had been operated 9.2 hours since the fuel nozzles were installed.

Based on the available information, it is likely that maintenance personnel did not fully torque the fuel port cap before the airplane was returned to service, which allowed the cap to loosen due to engine vibration during normal operation and then back off. At that point, the fuel supply to the engine would have been interrupted, and the engine would have lost all power due to fuel starvation. Restoring fuel flow to the engine in-flight in this situation would not have been possible.

Probable Cause and Findings

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

Maintenance personnel's failure to fully torque the fuel port cap, which allowed the cap to back off in flight and interrupted fuel flow to the engine, which resulted in a total loss of engine power.

Findings

Aircraft	Fuel distribution - Incorrect service/maintenance
Aircraft	Fuel - Incorrect service/maintenance
Personnel issues	Modification/alteration - Maintenance personnel
Environmental issues	Tree(s) - Contributed to outcome

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Enroute-cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing	Collision with terr/obj (non-CFIT)

On October 28, 2016, at 0954 mountain daylight time, a Cirrus Design SR22 airplane, N234PJ, was substantially damaged during a forced landing following a loss of engine power during cruise flight near Bloomfield, New Mexico. The pilot was not injured. The airplane was registered to Coastal King Aviation, LLC, and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which was not operated on a flight plan. The flight originated from the Albuquerque International Airport (ABQ), Albuquerque, New Mexico, at 0903. The intended destination was the Stevens Field Airport (PSO), Pagosa Springs, Colorado.

The pilot reported that shortly after leveling at a cruise altitude of 11,500 feet mean sea level, the engine starting "missing" and within two minutes lost power completely. His attempts to restore engine power were not successful. He was unable to locate a suitable forced landing site within the glide range of the airplane and elected to active the Cirrus Airframe Parachute System. The airplane came to rest in an area of low brush and small trees. The aft fuselage/empennage separated from the airframe during the accident sequence and was located immediately adjacent to the airplane at the accident site.

A post-recovery engine examination was conducted under supervision of the NTSB investigator-in-charge. The engine cowling appeared intact and securely installed. The cowling was removed. The engine assembly appeared intact and undamaged, with one exception. The lower surface of the oil sump pan was dented consistent with contact from the nose landing gear strut on touch down. The propeller assembly remained securely attached to the engine propeller flange and appeared undamaged. The engine crankshaft rotated freely. The upper spark plugs exhibited normal operating signatures. Borescope examination of the cylinders did not reveal any anomalies. The magnetos and ignition harness appeared undamaged. Engine control continuity was confirmed. At the time of the postaccident examination, the recording hour (Hobbs) meter indicated 980.8 hours.

The examination revealed that the cap on the unmetered fuel tee fitting at the throttle body metering unit was not installed. The cap was subsequently recovered from the cylinder baffling immediately below the throttle body metering unit. Both the fitting and the cap appeared to be undamaged. The cap was subsequently reinstalled. A portable fuel supply was provided to the airframe at the left wing root and the engine was run on the airframe. The engine started without difficulty and ran at idle power for several minutes. Engine power was not increased above idle during the test run due to safety considerations.

Data downloaded from the onboard avionics indicated that the flight departed at 0903, and after takeoff, the airplane climbed to about 10,500 ft mean sea level (msl). About 0945, the airplane began a climb, reaching 11,400 ft msl about 2-1/2 minutes later. The engine speed and fuel flow were stable during this timeframe. About 0948:06, the engine speed and fuel flow decayed abruptly, and the airplane entered a gradual descent. The engine speed did not recover for the duration of the recorded data. The fuel flow initially decreased from about 18.0 gph before the event to 9.9 gph, before increasing to about 30.0 gph for a period of time. The recorded data ended at 0954.

A review of the airplane maintenance records revealed that the most recent annual inspection was completed on March 4, 2016, at 951.6 hours airframe total time. On May 19, 2016, at 959.3 hours total airframe time, the engine was removed due to a propeller strike event. [Federal Aviation Administration records revealed that on May 13, 2016, the accident airplane was involved in a propeller strike incident during landing at the Dothan Regional Airport (DHN).] A factory rebuilt engine was subsequently installed on September 7, 2016. A hard/overweight landing inspection was completed with no defects noted. According to the records, the propeller assembly and propeller governor were also overhauled and reinstalled at that time. The maintenance records noted that an engine run-up inspection was completed in accordance with the IO550 Permold Series Engine Installation and Operation Manual, section 3-2.7. The fuel system was adjusted in accordance with the Maintenance and Overhaul Manual (M-16), section 6-3.7 "Engine Operational Check."

Maintenance records indicated that on October 5, 2016, at 959.3 hours airframe total time, the engine manufacturer's fuel nozzles were removed and replaced with General Aviation Modifications Inc. fuel nozzles. On October 12, 2016, at 971.6 hours airframe total time, an operational flight check was completed in accordance with the IO550 Permold Engine Installation and Operation Manual, sections 4-2.3 and 4-2.3.2. In addition, a ground run was conducted in order to verify fuel system settings in accordance with sections 6-3.7.4.2 and 6-3.7.4.3 of the engine maintenance and overhaul manual. The airplane maintenance records contained no subsequent entries.

The Engine Maintenance and Overhaul Manual, section 6-3.7.4.2 Fuel System Operational Checkout with Calibrated Gauges, specified removal of the unmetered fuel port fitting cap at the throttle body metering unit in order to connect an external fuel pressure gauge. The procedure also specified reinstalling the cap once the testing and any necessary fuel system adjustments had been completed.

The Pilot's Operating Handbook indicated that the fuel flow transducer was installed between the fuel pump/mixture control and the throttle body metering unit, which was upstream in the fuel flow relative to the fuel port fitting. The engine driven fuel pump and mixture control are combined into one component.

Pilot Information

Certificate:	Private	**Age:**	52,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	October 29, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	November 2, 2015
Flight Time:	597.2 hours (Total, all aircraft), 482.5 hours (Total, this make and model), 503.3 hours (Pilot In Command, all aircraft), 5.1 hours (Last 90 days, all aircraft), 5.1 hours (Last 30 days, all aircraft), 5.1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N234PJ
Model/Series:	SR22 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2005	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1729
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	March 4, 2016 Annual	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:	22 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	980.8 Hrs at time of accident	**Engine Manufacturer:**	CONT MOTOR
ELT:	C91 installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-550-N41B
Registered Owner:	On file	**Rated Power:**	550 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:	FMN,5506 ft msl	**Distance from Accident Site:**	16 Nautical Miles
Observation Time:	09:53 Local	**Direction from Accident Site:**	280°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.25 inches Hg	**Temperature/Dew Point:**	12°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Albuquerque, NM (ABQ)	**Type of Flight Plan Filed:**	None
Destination:	Pagosa Springs, CO (PSO)	**Type of Clearance:**	None
Departure Time:	09:00 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	36.698055,-107.991668

Administrative Information

Investigator In Charge (IIC):	Sorensen, Timothy
Additional Participating Persons:	John Schroeder; FAA – Flight Standards; Albuquerque, NM Brannon D Mayer; Cirrus Aircraft; Duluth, MN Kurt Gibson; Continental Motors Group; Mobile, AL
Original Publish Date:	November 6, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=94318