Aviation Investigation Final Report

Location:	Addison, Texas	**Accident Number:**	CEN18LA392
Date & Time:	September 30, 2018, 11:21 Local	**Registration:**	N818GM
Aircraft:	Cirrus SR22	**Aircraft Damage:**	Substantial
Defining Event:	Sys/Comp malf/fail (non-power)	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The private pilot and flight instructor were conducting a cross-country instructional flight. During departure and while climbing through 2,800 ft mean sea level, the pilot and instructor noticed multiple avionics malfunctions and initiated a turn back toward the airport. While the airplane was turning, the engine lost all power, and the pilots noted indications of a fire. Because they were unable to find a suitable area for a forced landing, the pilot activated the airplane's parachute system. The airplane descended under the parachute into a parking lot, and the main wing spar sustained substantial damage.

Examination of the engine revealed that the engine exhaust muffler attachment hardware was not secured correctly, which allowed the exhaust collector to freely rotate. A hole near the lower right engine cowling was consistent with escaping hot exhaust gas. Several components in the right forward side of the firewall were thermally damaged, and both magneto p-leads were shorted against the engine's metal mount frame. The thermal damage interrupted both magnetos' function, which resulted in the loss of engine power.

During a pre-buy inspection of the airplane, the No. 1 cylinder base O-ring was replaced. The work order, dated 3 days before the accident, required removal of the muffler. During the muffler reinstallation, maintenance personnel likely did not correctly install the attachment hardware, which resulted in the muffler separating in flight, thermal damage that interrupted the magnetos' function, and the subsequent loss of engine power.

Probable Cause and Findings

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

Maintenance personnel's improper installation of the muffler attachment hardware, which resulted in the muffler separating in flight, thermal damage that interrupted the magnetos' function, and the subsequent total loss of engine power.

Findings

Personnel issues	Repair - Maintenance personnel
Aircraft	(general) - Incorrect service/maintenance

Factual Information

History of Flight

Enroute-climb to cruise	Sys/Comp malf/fail (non-power) (Defining event)
Enroute-climb to cruise	Fire/smoke (non-impact)
Enroute-climb to cruise	Loss of engine power (total)

On September 30, 2018, about 1121 central daylight time, a Cirrus SR22 airplane, N818GM, impacted terrain following a total loss of engine power near Addison Airport (ADS), Dallas, Texas. The pilot and flight instructor were not injured, and the airplane was substantially damaged. The airplane was registered to and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91 as an instructional flight. Day visual meteorological conditions prevailed for the flight, which departed ADS about 1115, with a destination of Waco Regional Airport (ACT), Waco, Texas.

While on departure climbing through 2,800 ft mean sea level, the pilot and flight instructor noticed multiple avionics malfunctions and turned back toward ADS. During this turn, the engine lost total power and indications of a fire were noticed. When the flight instructor and pilot recognized the airplane was not within gliding distance of ADS or a suitable forced landing area, the pilot initiated the Cirrus Airframe Parachute System (CAPS). The airplane descended under parachute into a parking lot and the main spar was damaged. Accident site examination revealed a hole near the lower right engine cowling from a burn through.

Examination at the recovery facility revealed two of the three sets of hardware were missing from the muffler attach point. The remaining bolt, washers, spring and castellated nut remained attached, but no cotter pin was installed. Without the muffler attachment hardware, the exhaust collector was free to rotate. The hole in the lower right engine cowling was consistent with escaping hot exhaust gas.

Various components in the right forward side of the firewall were thermally damaged. Numerous white areas consistent with electrical arcing were present, including both magneto p-leads shorted against the metal engine mount frame. Although both magneto p-leads were shorted, the two magnetos were not damaged. After the magneto p-leads were disconnected, the magnetos produced sparks at all ignition leads when the engine was manually rotated.

During a pre-buy inspection of the airplane, a report prepared by the maintenance provider listed issues discovered and corrective actions performed. Two of the entries were "#1-cylinder base o-ring is seeping" and "replaced #1-cylinder base o-ring P/N 641066 IAW TCM IO-550-N MN CH17-3". The work order to replace the cylinder o-ring, dated three days prior to the accident, required removal and reinstallation of the muffler.

Pilot Information

Certificate:	Private	**Age:**	44,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:	BasicMed	**Last FAA Medical Exam:**	February 19, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	April 19, 2018
Flight Time:	509 hours (Total, all aircraft), 2 hours (Total, this make and model), 494 hours (Pilot In Command, all aircraft), 38 hours (Last 90 days, all aircraft), 14 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Flight instructor Information

Certificate:	Airline transport; Commercial	**Age:**	27,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	July 25, 2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	December 15, 2017
Flight Time:	1514 hours (Total, all aircraft), 113 hours (Total, this make and model), 1289 hours (Pilot In Command, all aircraft), 78 hours (Last 90 days, all aircraft), 53 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cirrus	**Registration:**	N818GM
Model/Series:	SR22	**Aircraft Category:**	Airplane
Year of Manufacture:	2002	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	0256
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	May 23, 2018 100 hour	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:	13 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1334 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed	**Engine Model/Series:**	IO-550N
Registered Owner:	On file	**Rated Power:**	310 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:	KDAL,488 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	11:39 Local	**Direction from Accident Site:**	202°
Lowest Cloud Condition:	Scattered / 2000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 3500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.15 inches Hg	**Temperature/Dew Point:**	26°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Dallas, TX (ADS)	**Type of Flight Plan Filed:**	IFR
Destination:	Waco, TX (ACT)	**Type of Clearance:**	IFR
Departure Time:	11:15 Local	**Type of Airspace:**	Class B

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	In-flight
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	32.896945,-96.834167(est)

Administrative Information

Investigator In Charge (IIC):	Folkerts, Michael
Additional Participating Persons:	Kevin Taylor; Flight Standards DIstrict Office; Irving, TX Mike Council; Continental Motors; Mobile, AL Eric Settergren; Cirrus Aircraft; Duluth, MN
Original Publish Date:	April 13, 2020
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=98376