

National Transportation Safety Board

Office of Aviation Safety
Central Region



CEN22FA405

ACCIDENT SITE AND WRECKAGE EXAMINATION SUMMARY

ACCIDENT

Location: Tomball, Texas
Date: September 1, 2022
Time: 1707 central daylight time (2207 UTC)
Airplane: Cirrus SR22, Registration No. N420SS

PARTICIPANTS

Investigator-In-Charge	Andrew Todd Fox National Transportation Safety Board Denver, Colorado
Group Member	Robert N. McGee Federal Aviation Administration Houston, TX
Group Member	Brannon D. Mayer Cirrus Aircraft Duluth, MN
Group Member	J Ferrell Continental Aerospace Technologies Mobile, AL

ACCIDENT SYNOPSIS

On September 1, 2022, about 1707 central daylight time, a Cirrus Aircraft SR22 airplane, N420SS, was substantially damaged when it was involved in an accident near Tomball, Texas. The flight instructor was fatally injured; the pilot and passenger sustained serious injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

WRECKAGE EXAMINATION TIMELINE

September 2, 2022 - An onsite examination of the airplane and its engine was completed by a National Transportation Safety Board (NTSB) Investigator-in-Charge (IIC) who was assisted by representatives from the Federal Aviation Administration (FAA) and Cirrus Aircraft. Continental Aerospace Technologies did not participate during the on-scene investigation.

September 3-5, 2022 - The NTSB IIC led wreckage layout and examination was completed at a hangar located at the David Wayne Hooks Memorial Airport, Spring, Texas. The NTSB IIC was assisted by representatives from the FAA and Cirrus Aircraft. Continental Aerospace Technologies did not participate. The insurance company subsequently coordinated for the wreckage to be relocated and secured at Air Salvage of Dallas, Lancaster, Texas.

April 16, 2024 - The NTSB IIC reexamined wreckage at Air Salvage of Dallas, Lancaster, Texas, and was assisted by representatives from Cirrus Aircraft and Continental Aerospace Technologies. A FAA representative was not present during the examination.

AIRPLANE DESCRIPTION

The airplane, a Cirrus Aircraft SR22, serial number 8750, was manufactured on July 30, 2022. The low-wing airplane was of composite construction and was equipped with a fixed tricycle landing gear, flaps, and could seat five individuals. The airplane was powered by a 310 shaft-horsepower Continental IO-550-N70B, serial number 1043449, through a 3-blade, constant speed, Hartzell PHC-J3YF-1RF/F7693DF propeller assembly, serial number FP9999B. The airplane was approved for operations in instrument meteorological conditions. The airplane had a maximum allowable takeoff weight of 3,600 lbs. On August 29, 2022, the pilot/owner completed a FAA Aircraft Registration Application when he accepted delivery of the airplane from Cirrus Aircraft Delivery Center, Knoxville, Tennessee.

The airplane has a 92-gallon usable wet-wing fuel storage system. The system consists of a 47.25-gallon capacity (46-gallon usable) vented integral fuel tank and a fuel collector/sump in each wing and a total fuel capacity of 94.5 gallons (92 gallons usable). The airplane fuel tanks were topped-off with 59.2 gallons of 100 low-lead aviation fuel before the flight. The flight began with a full fuel load, or 92 gallons usable.

According to the Cirrus SR22 Pilot Operating Handbook (POH), at maximum takeoff weight (3,600 lbs) the aerodynamic stall speed with flaps extended for landing (100%) is 64 knots. The aerodynamic stall speed at maximum takeoff weight with flaps extended for takeoff (50%) is 70 knots. The aerodynamic stall speed at maximum takeoff weight with the flaps retracted (0%) is 74 knots. The approach speed with flaps in the landing position (100%) is 80-85 knots. The POH also stipulates that the electric fuel pump be selected to "boost" before landing.

According to the Cirrus SR22 POH, the airplane's maximum glide ratio was 8.8 to 1. During a forced landing with no wind, the airplane flown at 92 KIAS with the flaps fully retracted would glide 1.45 nm laterally for every 1,000 ft of altitude loss. The POH

does not provide glide performance data for the airplane with flaps extended to 50% or 100%.

MAINTENANCE SUMMARY

The airplane is equipped with two hour meters located inside the armrest storage compartment between the pilot and copilot seats. The #1 hour meter, labeled HOBBS begins recording when the BAT 1 switch is ON and either the ALT 1 or ALT 2 switch is ON. The #2 hour meter records flight time and is labeled FLIGHT. Recording begins when the airplane reaches a speed of approximately 35 KIAS and is controlled by the Integrated Avionics Unit. At the time of the accident, the airplane had accumulated 20.6 hours Hobbs time and 14.7 hours Flight Time. A postaccident review of the available maintenance records found no history of unresolved airworthiness issues.

WRECKAGE EXAMINATIONS (SEPTEMBER 2-5, 2022)

The accident site was in a wooded mobile home neighborhood about 0.76 nautical miles (nm) north (352° true) of the runway 17R displaced threshold. The accident site was about 0.59 nm from the runway 17R threshold. The initial impact point was a grouping of 60-75-foot-tall pine trees. There were multiple (2 or 3) pine trees knocked over by the airplane during the accident. There were numerous tree branches scattered along the wreckage debris path and amongst the main wreckage. The Cirrus Airframe Parachute System (CAPS) rocket motor had deployed upon impact. The parachute canopy, rocket motor and deployment bag were found suspended in the surrounding trees. The parachute's enclosure cover separated from the aft cabin and was found near the main wreckage. The canopy did not inflate during deployment and was found stretched-out on a linear trajectory into the surrounding treetops.

The main wreckage consisted of the main cabin, left wing, aft fuselage, empennage, engine, and propeller. The right wing separated from the fuselage at the wing root and was found on the opposite side yard of the mobile home structure. The left aileron was found adjacent to the right wing. All remaining flight controls (right aileron, right flap, left flap, elevator, and rudder) remained attached to their respective support hinges.

Flight control continuity for the elevator, rudder, and aileron could not be established due to impact damage; however, the observed cable separations were consistent with overstress. The roll and pitch trim motors were found in neutral trim positions. The flap selector was found in the up position. The wing flap actuator jack screw was found fully extended, consistent with fully retracted flaps.

Before wreckage recovery, the power and mixture controls were found in the full forward position. The 3-position electric fuel pump switch was in the OFF position. The engine starter/ignition key switch was positioned to left magneto. The fuel selector lever was found positioned to the left fuel tank. An examination of the fuel selector confirmed the valve was positioned to the left fuel tank at impact. There was a strong odor of 100-low lead aviation fuel at the accident site. Neither fuel tank contained any measurable amount of fuel; however, based on Cirrus RDM data there was ample fuel in both fuel tanks upon impact. All fuel supply and return lines were fractured near their respective wing roots.

The entire fuel system was examined from each wing tank to the engine fuel injector lines. There was no evidence of any preimpact restrictions or debris in the fuel system. The fuel tanks were clean and without any notable debris. All fuel supply and return lines were fractured near their respective wing roots. The flexible fuel supply line from the firewall to the electric fuel pump inlet was clear of restrictions. The 90° elbow inlet fitting to the electric fuel pump was found separated. There was impact related damage to the lower right engine compartment near the electric fuel pump. Blue fuel staining was observed on the interior and exterior surfaces of the inlet fuel fitting. The inlet fuel fitting and fuel supply line were submitted to the NTSB Materials Laboratory for additional examination to determine whether the fitting separated while inflight or during impact.

The electric fuel pump functioned normally on high-output (prime) when connected to the airplane's 28-volt battery. The electric fuel pump started briefly on low-boost before it stopped running likely due to excessive voltage (28 volts) being applied instead of a reduced voltage.

The fuel line from the electric fuel pump to the fuel filter assembly was intact and the B-nut fittings were tight. There were no obstructions, restrictions, or debris found in the fuel line between the electric fuel pump and the fuel filter assembly. The fuel filter assembly screen was clean and free of debris.

The fuel line from the fuel filter assembly to the engine-driven fuel pump was intact and the B-nut fittings were tight. There were no obstructions, restrictions, or debris found in the fuel line between the fuel filter assembly and the engine-driven fuel pump. There was a small amount of clean 100 low-lead aviation fuel drained from the fuel line to the inlet side of the engine-driven fuel pump, and from within the fuel pump. The engine-driven fuel pump drive coupling was intact, and the engine-driven fuel pump functioned when tested.

The fuel line between the engine-driven fuel pump and the fuel flow transducer contained a small amount of clean 100-low lead aviation fuel. The fuel flow transducer was clear of any debris and air passed freely through the assembly. The fuel lines downstream of the fuel flow transducer contained clean 100 low-lead aviation fuel.

The engine remained attached to its engine mount and the firewall. There was mechanical continuity between the throttle and mixture controls to their respective engine components. The upper spark plugs were removed and exhibited features consistent with normal engine operation. Internal engine and valve train continuity were confirmed as the crankshaft was rotated through the propeller. Compression and suction were noted on all six cylinders in conjunction with crankshaft rotation. A borescope inspection of each cylinder did not reveal any anomalies with the cylinders, pistons, valves, valve seats, or lower spark plugs. Both magnetos remained attached to their engine installation points and provided spark on all ignition leads in conjunction with crankshaft rotation. Compressed air was applied to the fuel line downstream of the fuel flow transducer to test the fuel manifold. The compressed air discharged fuel and air from all 6 fuel injector lines.

The airplane was equipped with a recoverable data module (RDM) (p/n 153510-000064, s/n 002616). A successful download of the approximately last 8 hours of data was completed. The recovered data indicated that there was a sudden and total loss of fuel flow about 1 minute before the accident. The RDM device was retained by the NTSB IIC.

WRECKAGE EXAMINATION (APRIL 16, 2024)

The wreckage was reexamined at Air Salvage of Dallas, Lancaster, Texas. The entire fuel system was examined from each wing tank to the individual engine fuel injectors. There was no evidence of any preimpact obstructions or debris in the fuel system. The fuel tanks were clean and without any notable debris. All fuel supply and return lines were fractured near their respective wing roots. The fuel supply and fuel return lines from the fuel selector to the firewall fittings were free of obstructions and debris when air was blown through the lines.

Examination of the left wing fuel tank venting revealed no anomalies when air was blown through the vent line. The left wing fuel tank screen was clear of debris. The fuel check/flapper valve located in the left wing fuel collector tank functioned normally. The left wing fuel supply and fuel return lines fractured near the wing root. No obstructions or debris were observed when air was blown through the left wing fuel supply and fuel return lines.

Examination of the right wing fuel tank venting revealed no anomalies when air was blown through the vent line. The right wing fuel tank screen was clear of debris. The fuel check/flapper valve located in the right wing fuel collector tank functioned normally. The right wing fuel supply and fuel return lines fractured near the wing root. No obstructions or debris were observed when air was blown through the right wing fuel supply and fuel return lines.

The engine was reexamined with the assistance of a Continental Aerospace Technologies investigator who was not present during the initial examination. The engine remained attached to its engine mount and the firewall. During the initial engine examination there was mechanical continuity between the throttle and mixture controls to their respective engine components. The engine-driven fuel pump and fuel-flow transducer were removed from the engine during the previous examination. The upper spark plugs were removed and exhibited features consistent with normal engine operation. Internal engine and valve train continuity were confirmed as the crankshaft was rotated through the crankshaft flange. Compression and suction were noted on all six cylinders in conjunction with crankshaft rotation. A borescope inspection of each cylinder did not reveal any anomalies with the cylinders, pistons, valves, valve seats, or lower spark plugs. Both magnetos remained attached to their engine installation points and provided spark on all ignition leads in conjunction with crankshaft rotation. The vapor return line from the fuel manifold to the engine-driven fuel pump was free of obstructions when air was blown through the line.

The throttle and control unit (p/n 653353-5A1, s/n A22CA107) was removed for additional examination and bench testing.

The fuel distribution valve (p/n 646433-5A5, s/n C22CA031), injector lines, and fuel injectors were removed for additional examination and bench testing.

The throttle body/metering valve, fuel manifold, injector lines, and fuel injectors were combined with the previously removed engine-driven fuel pump (p/n 655921-6A1, s/n B22CA065) and fuel flow transducer (p/n 15415-004, s/n 234141) with two short flexible fuel lines into a single shipment box. The items were shipped via UPS Overnight to Phillip Grice's attention at Continental Aerospace Technologies in Mobile, Alabama.