



Aviation Investigation Final Report

Location:	Hutchinson, Minnesota	Accident Number:	CEN22FA111
Date & Time:	January 31, 2022, 12:56 Local	Registration:	N227BD
Aircraft:	CIRRUS DESIGN CORP SR22	Aircraft Damage:	Substantial
Defining Event:	Unknown or undetermined	Injuries:	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

During a familiarization flight, the pilot configured the airplane at an airspeed of 80 knots, with full flaps extended, in preparation for a touch-and-go landing. The mixture was set to full rich and the fuel boost pump was set on “Low Boost.” According to the flight instructor, the approach altitude was slightly high, so he instructed the pilot to perform a forward slip. The pilot decreased the engine power to idle and performed the forward slip as instructed. The flight instructor reported that, as they crossed the runway threshold, the pilot allowed the airspeed to get too slow and he did not stop the descent rate, which resulted in a “noticeable bounce” on the main landing gear.

The flight instructor told the pilot to initiate a go-around and the pilot added power, reduced the flaps to 50%, and established a normal climb attitude. The flight instructor reported that the airplane began to climb very slowly. He stated the airspeed increased to 80 knots, at which time he instructed the pilot to raise the flaps. The flight instructor confirmed the airplane’s flaps were up, but the airplane continued to climb about 300 ft per minute. He stated that he expected an increase in airspeed but was surprised that the airspeed was slightly above 85 knots. In addition, he felt a “shudder of an irregular vibrational tick.” He stated it was a noticeable “clunky” sound that resonated through the fuselage every few seconds. The airplane continued to climb at a slower-than-normal rate.

Upon reaching 500 ft above ground level the flight instructor stated, “CAPS [Cirrus Airframe Parachute System] available.” At this time, the pilot turned over control of the airplane to the flight instructor. The airplane’s performance continued to decrease so the flight instructor aligned the airplane for an open field and the pilot deployed the airplane parachute system. The flight instructor secured the airplane before it impacted an open snow-covered field.

The airplane sustained substantial damage to the forward fuselage, both wings, and the

rudder. The fuel selector valve shaft was fractured between the valve handle and the valve shaft housing and the valve was positioned between the right fuel tank and the off position. The fuel selector valve was moved by first responders after the accident from the right fuel tank to the off position. Investigators were unable to determine if the fractured valve shaft was a result of the accident or due to movement of the handle by first responders after the accident. Testing performed by the manufacturer indicated that engine performance and fuel flow would not be impacted with the fuel selector valve handle between the two tanks and partially open.

The engine fuel lines were secure. The fuel servo and boost pump fuel inlet lines were absent of fuel and a small amount of fuel was present in both the left and right wing header tanks. The left fuel tank was compromised and fuel staining was observed directly beneath the wing. There was no visible fuel in the right wing fuel tank. Investigators were unable to determine how much fuel was on board at the time of the accident because of the compromised fuel tank.

Recorded parameters from the onboard data module were consistent with the training flight described by the flight instructor. About 1254 the recorded parameters were consistent with the go-around initiated by the pilot with an increase in engine rpm, fuel flow, and manifold pressure. However, the increase in fuel flow was not equivalent to the increase seen during the initial takeoff and at several points earlier in the flight. At that time the exhaust gas temperature and cylinder head temperatures for cylinder Nos. 2, 4, and 6 diverged; cylinder No. 2 increased in temperature and cylinder No. 6 decreased in temperature.

Two postaccident engine runs confirmed the function of the engine but were limited in duration due to impact damage. An examination of the engine, airframe, and related systems revealed no mechanical anomalies that would have precluded normal operations. The recorded engine parameters and the description from the flight instructor are consistent with a loss of engine power, likely due to a reduced fuel flow; however, investigators were unable to determine the reason for the reduced fuel flow and subsequent loss of engine power.

The pilot's postmortem toxicology testing indicated that he had used the antidepressant medication citalopram. It is unlikely that effects of this medication or an associated underlying condition contributed to the crash; the pilot's actions as reported by the surviving instructor appeared appropriate to the situation.

Probable Cause and Findings

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

The reduction in fuel flow and subsequent partial loss of engine power after takeoff for reasons that could not be determined.

Findings

Aircraft	(general) - Unknown/Not determined
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Factual Information

History of Flight

Landing	Hard landing
Initial climb	Unknown or undetermined (Defining event)
Emergency descent	Off-field or emergency landing

On January 31, 2022, about 1256 central standard time, a Cirrus SR22 airplane, N227BD, was substantially damaged when it was involved in an accident near Hutchinson, Minnesota. The flight instructor was seriously injured, and the private pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

The purpose of the flight was to familiarize the pilot with the newly purchased airplane. The flight instructor reported that they performed a thorough airplane preflight, checked the weather, calculated the weight and balance, reviewed takeoff and landing airplane performance, and talked through the flight briefing before they departed Flying Cloud Airport (FCM) for the practice area. The flight instructor stated that the airplane was fueled up to the tabs. He reported that en route to the practice area, they discussed engine failure and Cirrus Airframe Parachute System (CAPS) deployment procedures.

After practicing maneuvers, they proceeded to the Hutchinson Municipal Airport – Butler Field (HCD) to practice a touch-and-go landing. They entered the traffic pattern, and the pilot aligned the airplane on final approach at an airspeed of 80 knots with full flaps extended. The flight instructor stated that the mixture was set to full rich and the fuel boost pump was set on “Low Boost.” He stated that the approach was slightly high, so he instructed the pilot to perform a forward slip. The pilot decreased the engine power to idle and performed the forward slip as instructed. The flight instructor reported that as they crossed the runway threshold, the pilot allowed the airspeed to get too slow and he did not stop the descent rate, which resulted in a “noticeable bounce” on the main landing gear. The pilot initiated a go-around as instructed by the flight instructor.

The pilot added power, reduced the flaps to 50%, and established a normal climb attitude for the go-around. The flight instructor reported that the airplane began to climb, but very slowly. He stated the airspeed increased to 80 knots, at which time he instructed the pilot to raise the flaps. The flight instructor confirmed the airplane’s flaps were up, but the airplane continued to climb about 300 ft per minute. He stated he expected an increase in airspeed but was surprised that the airspeed was slightly above 85 knots. In addition, he felt a “shudder of an

irregular vibrational tick.” He stated it was a noticeable “clunky” sound that resonated through the fuselage every few seconds. The airplane continued to climb but at a slower than normal rate.

Upon reaching 500 ft above ground level (agl) or 1,500 ft above mean sea level (msl), the flight instructor stated “CAPS available.” The pilot turned over control of the airplane to the flight instructor. The flight instructor took over the controls and ensured the throttle was full forward. He made a gradual turn to align the airplane with an open field then leveled the wings, noting that the altimeter indicated 1,600 msl and that the airspeed had decreased into the “70s.” The flight instructor told the pilot to deploy the parachute, and the flight instructor kept the airplane level until the forward parachute straps tightened. He then reduced the throttle to idle, turned off the mixture, and made a mayday call. The flight instructor reported that he does not recall the impact sequence.

The airplane touched down in a field about 2 miles southeast of HCD.

Pilot Information

Certificate:	Private	Age:	61, 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:	Yes
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	June 12, 2020
Occupational Pilot:	No	Last Flight Review or Equivalent:	January 22, 2022
Flight Time:	(Estimated) 138 hours (Total, all aircraft)		

Flight instructor Information

Certificate:	Flight instructor	Age:	34, Male
Airplane Rating(s):	Single-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	Toxicology Performed:	
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	October 14, 2020
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	October 2, 2020
Flight Time:	729.1 hours (Total, all aircraft), 295.3 hours (Total, this make and model), 670.1 hours (Pilot In Command, all aircraft), 47.3 hours (Last 90 days, all aircraft), 10.3 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	Registration:	N227BD
Model/Series:	SR22	Aircraft Category:	Airplane
Year of Manufacture:	2008	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	3134
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	November 24, 2021 Annual	Certified Max Gross Wt.:	3400 lbs
Time Since Last Inspection:	19.9 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	1015.7 Hrs at time of accident	Engine Manufacturer:	Continental
ELT:	C126 installed	Engine Model/Series:	IO-550-N
Registered Owner:	On file	Rated Power:	310
Operator:	On file	Operating Certificate(s) Held:	None

The airplane was fueled with 29.5 gallons of 100LL aviation fuel before the flight. The flight instructor stated that they verified the fuel level was up to the tabs, which would have been about 30 gallons of fuel in each fuel tank or 60 gallons total fuel.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KHCD,1062 ft msl	Distance from Accident Site:	1.9 Nautical Miles
Observation Time:	12:55 Local	Direction from Accident Site:	320°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	130°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.75 inches Hg	Temperature/Dew Point:	-5°C / -8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Eden Prairie, MN (FCM)	Type of Flight Plan Filed:	None
Destination:	Hutchinson, MN (HCD)	Type of Clearance:	None
Departure Time:	11:45 Local	Type of Airspace:	Class G

Airport Information

Airport:	Hutchinson Municipal Airport HCD	Runway Surface Type:	Asphalt
Airport Elevation:	1062 ft msl	Runway Surface Condition:	Dry
Runway Used:	15	IFR Approach:	None
Runway Length/Width:	4000 ft / 75 ft	VFR Approach/Landing:	Touch and go

Wreckage and Impact Information

Crew Injuries:	1 Fatal, 1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal, 1 Serious	Latitude, Longitude:	44.83047,-94.3503

The airplane touched down in an open snow-covered field and the debris field was contained to the immediate area. The furthest piece of wreckage was a propeller blade located about 400 ft from the main wreckage. The main wreckage came to rest upright. The lower portion of the forward fuselage and the engine compartment were compressed and crushed upward. The

sides of the fuselage were cracked between the instrument panel and front seats. The left wing remained attached to the fuselage, and the aft fuselage remained intact. The empennage remained attached except for the rudder, which was separated at all but its lowest attach point.

A postaccident examination confirmed flight control continuity from the wing roots to the ailerons and from under the aft seats to the rudder and elevator. The cockpit control stick and rudder pedals were not able to be manipulated due to impact damage. All the flight control fractures were consistent with impact damage. The flap handle was in the up position and the flap actuator screw was fully extended, which was consistent with the flaps in the retracted position. The fuel caps were present on both the right and left wings. No fuel was visible in the right fuel tank. The underside of the left wing exhibited cracking and a small area of blue staining consistent with 100LL aviation fuel was visible with no corresponding staining noted on the snow below the wing.

The fuel selector valve shaft was fractured between the valve handle and the valve shaft housing. The valve was removed from the airframe and opened. The valve was positioned between the right fuel tank and the off position. The engine fuel lines were secure. The fuel servo and boost pump fuel inlet lines were removed and both lines were absent of fuel. Engine control continuity was confirmed.

According to the fire chief, the fuel selector valve was moved after the accident from the right fuel tank to the off position. A small amount of fuel was present in both the left and right wing header tanks. The fire chief reported a strong smell of fuel while on scene. No other anomalies were noted with the fuel system that would have precluded normal operations.

The CAPS system was examined, and the parachute deployment appeared to have been normal.

The airplane was equipped with a Heads-Up Technologies Recoverable Data Module (RDM) which recorded 96 parameters and a Garmin G1000 Integrated Flight Deck which recorded 64 parameters. The recording for the accident flight from the RDM started about 1115 and the last line recorded was time stamped 1259:59. The parameters recorded were consistent with the training flight described by the flight instructor.

About 1253:50, the engine parameters decreased consistent with the airplane's final approach to the airport. At 1254:17, the GPS data indicated that the airplane crossed the runway threshold. Two seconds later, the engine parameters increased consistent with the go-around described by the flight instructor. The fuel flow increased initially to 23.7 gallons per hour but then decreased to less than 13 gallons per hour; during the initial takeoff about 1145 the fuel flow increased to 38 gallons per hour (See Figure 1).

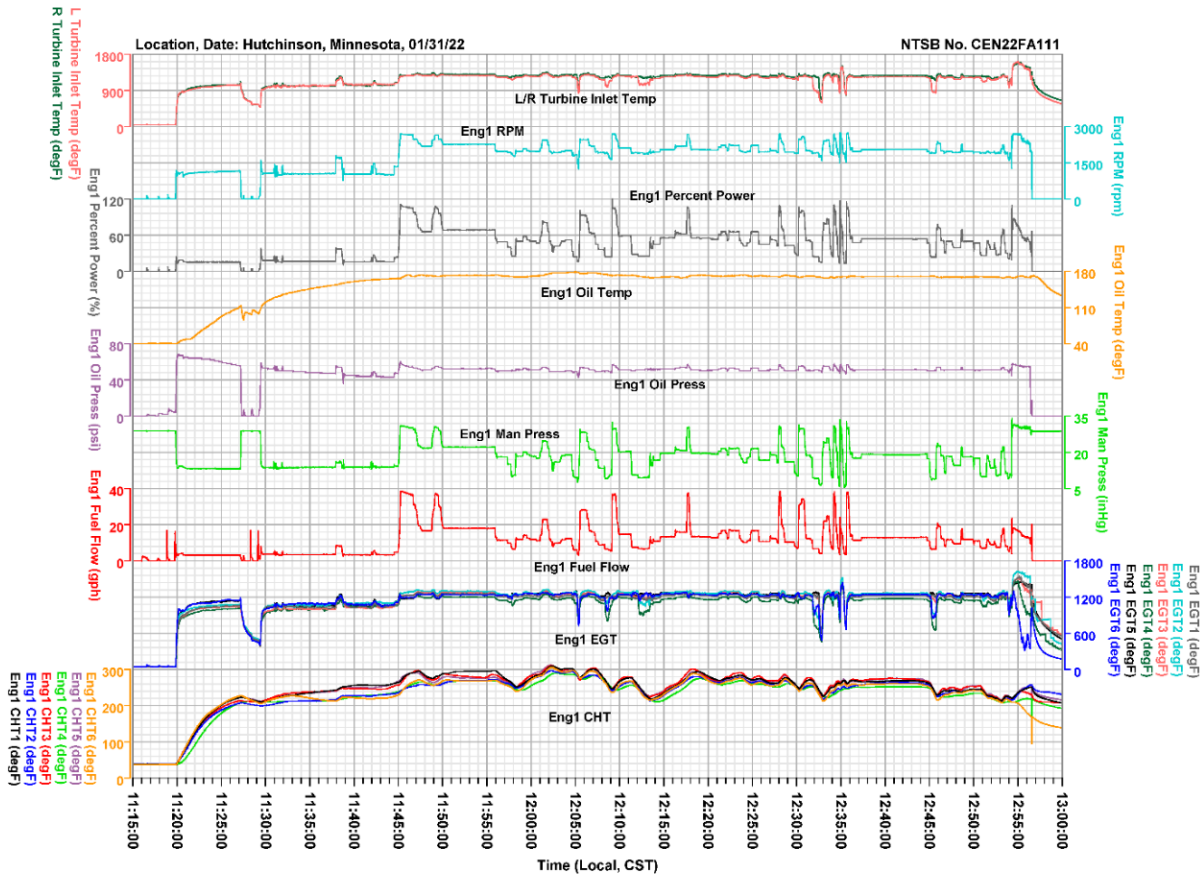


Figure 1. Plot of Engine Parameters from the RDM for the entire flight.

Following the increase in engine power, the exhaust gas temperature (EGT) and cylinder head temperature (CHT) for cylinder Nos. 2, 4, and 6 diverged. Over the next few minutes cylinder No. 2 increased to 1600° F (EGT) and 220° F (CHT), cylinder No. 4 initially increased and then dropped to 930° F (EGT) and stabilized around 220° F (CHT) and cylinder No. 6 decreased to below 500° F (EGT) and 175° F (CHT)(See Figure 2).

The recorded data also showed that the stall warning initially sounded about 1256:04 and again about 1256:15, continuing for about 8 seconds until the CAPS handle was pulled. At this same time the recorded engine parameters decreased consistent with the flight instructor’s description of adjusting the mixture control to lean and the engine throttle to idle.

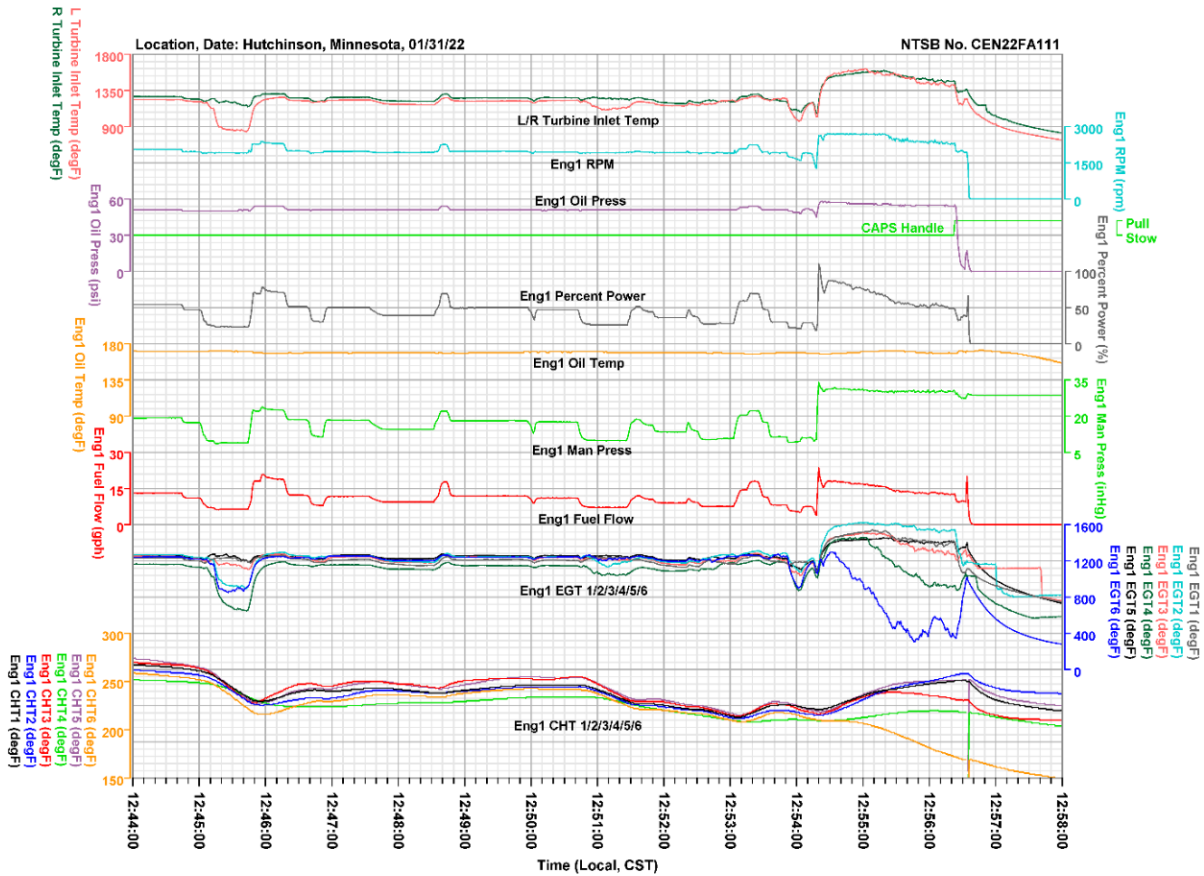


Figure 2. Plot of Engine Parameters from the RDM at the end of the flight from 1244 to 1258.

Medical and Pathological Information

An autopsy of the private pilot was conducted by the Hennepin County Medical Examiner's Office. The cause of death was listed as multiple blunt force injuries, and no significant natural disease was identified.

The Federal Aviation Administration (FAA) Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the pilot. Citalopram was detected in cavity blood, with inconclusive citalopram testing in urine. The citalopram metabolite n-desmethylcitalopram was detected in cavity blood and urine. Citalopram is a prescription antidepressant medication. Pilots on

citalopram may be approved by the FAA for medical certification on a case-by-case basis, depending on the underlying condition and response to treatment. The pilot had reported no medication use at his last aviation medical examination in June 2020. He had a history of prior Special Issuance medical certification for generalized anxiety disorder in 2018 and 2019, with a July 2020 letter from the FAA stating that Special Issuance was no longer required.

The pilot's postmortem toxicological testing also detected minoxidil in urine and carvedilol in cavity blood and urine.

Minoxidil is available as an over-the-counter topical treatment for hair regrowth; it is also available as a prescription oral medication used to treat high blood pressure. Carvedilol is a prescription medication that may be used to treat high blood pressure, heart failure, and to manage heart failure after a heart attack. Minoxidil and carvedilol are not generally considered impairing medications. Other substances (ketamine, the ketamine metabolite norketamine, and famotidine) detected by the pilot's postmortem toxicological testing were attributable to medications that were administered to the pilot after the crash, as verified from post-crash medical records.

Tests and Research

Engine run

Two test runs were conducted in the presence of the National Transportation Safety Board investigator. The runs were about 30 seconds and 60 seconds in duration, respectively. The engine started and ran smoothly to 2,900 rpm. The throttle response was smooth and immediate, and the throttle idle check was normal. The magneto check produced a drop of about 80 rpm on each magneto, and the engine operation was continuous and smooth during the check. Oil pressure stabilized about 65 psi during the test runs. The oil pump housing was damaged consistent with impact, which caused an oil leak during the engine run and a small leak was observed at the No. 6 exhaust valve cover that was replaced. The run time was limited for this reason.

Fuel selector valve test

Independently, Cirrus Aircraft conducted several tests with the fuel selector valve positioned between the right fuel tank and the off position. The results Cirrus provided illustrated that there was no appreciable change in the fuel flow as compared to a fuel selector valve position to one fuel tank or the other.

Administrative Information

Investigator In Charge (IIC):	Link, Samantha
Additional Participating Persons:	Greg Thurston; FAA Flight Standards; Minneapolis, MN Brannon Mayer; Cirrus Aircraft; Duluth, MN
Original Publish Date:	July 5, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=104579

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