



Aviation Investigation Final Report

Location:	Duluth, Minnesota	Accident Number:	ERA23FA130
Date & Time:	February 24, 2023, 16:07 Local	Registration:	N929DR
Aircraft:	CIRRUS DESIGN CORP SR22	Aircraft Damage:	Destroyed
Defining Event:	Unknown or undetermined	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During a short cross-country repositioning flight in day visual meteorological conditions, the airplane was about 4 miles from the destination airport, on an instrument approach at 1,300 ft mean sea level (msl), when the airplane pitched nose-down about 30° and remained in that attitude until ground impact. Review of onboard recorder data revealed that during the 1-minute period prior to manual autopilot disconnect and the final descent, the autopilot was in approach mode, using glidepath (GP) for vertical guidance and GPS for lateral guidance. With GP active, the vertical deviation slowly started to decrease until the final recorded vertical deviation was -952 ft. This would have resulted in the autopilot trimming nose-up to counteract the negative vertical deviation. After autopilot disconnected and during the final descent, the airplane's electronic stability protection (ESP) pitch mode activated and stayed active for the descent. The ESP pitch protection mode would be activated when the airplane reached a pitch engagement limit of -15.5° nose-down and the system would then command the pitch servos to apply a supplemental stick force back toward the nominal pitch attitude range. The supplemental stick force would increase with increasing pitch deviation until the maximum limit of -20.5° nose-down pitch was reached. About 40 lbs of forward force would be required on the control stick to override both the ESP and the as-found full nose-up trim condition to maintain a 30° descent angle to impact.

The final data point indicated that the airplane was at a pressure altitude of 370 ft, an indicated airspeed of 175 knots, and descending at a vertical speed of -6,880 ft per minute. The engine speed was 2,523 rpm with 10.9 inches of manifold pressure. Examination of the wreckage and recorded data did not reveal evidence of any preimpact mechanical malfunctions.

The pilot's autopsy was limited by the severity of his injuries, and insufficient medical evidence was available to determine whether a medical condition contributed to the accident.

Probable Cause and Findings

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

A rapid descent and subsequent collision with terrain for reasons that could not be determined based on the available evidence.

Findings

Not determined

(general) - Unknown/Not determined

Factual Information

History of Flight

Approach	Unknown or undetermined (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On February 24, 2023, about 1607 central standard time, a Cirrus Design Corp SR22, N929DR, was destroyed when it was involved in an accident near Duluth, Minnesota. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot co-owned the airplane and based it at Richard I Bong Airport (SUW), Superior, Wisconsin. The purpose of the accident flight was a short reposition from Duluth International Airport (DLH), Duluth, Minnesota to SUW. According to automatic dependent surveillance broadcast (ADS-B) data and data downloaded from the airplane's remote data module (RDM), about 4 minutes after takeoff from DLH, the airplane was on approach to SUW. The airplane was at 1,300 ft msl while on about a 4-mile final approach for runway 14 at SUW when it suddenly pitched down about 30°. The airplane continued to descend and impacted a frozen river about 3.5 miles from SUW.

Pilot Information

Certificate:	Airline transport; Commercial	Age:	52, Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 2 With waivers/limitations	Last FAA Medical Exam:	November 1, 2022
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	3895 hours (Total, all aircraft)		

The pilot's logbook was not recovered. On his most recent application for a Federal Aviation Administration (FAA) second class medical certificate, dated November 1, 2022, he reported

total flight experience of 3,895 hours, of which, 94 hours were accrued during the 6 months before the application date.

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	Registration:	N929DR
Model/Series:	SR22	Aircraft Category:	Airplane
Year of Manufacture:	2016	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	4441
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	April 7, 2022 Annual	Certified Max Gross Wt.:	3400 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	1300 Hrs at time of accident	Engine Manufacturer:	Continental
ELT:	Installed	Engine Model/Series:	IO-550-N
Registered Owner:	On file	Rated Power:	310 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

The airplane was manufactured in 2016 and equipped with a Continental IO-550N, 310-hp engine, driving a three-bladed Hartzell constant-speed propeller. Review of the aircraft logbooks revealed that the most recent annual inspection was completed on April 7, 2022. At that time, the airframe and engine had accumulated a flight time of 1,300 hours since new. According to the flight time meter, the airplane flew an additional 165 hours from the time of the inspection until the accident.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	SUW,674 ft msl	Distance from Accident Site:	3 Nautical Miles
Observation Time:	16:15 Local	Direction from Accident Site:	136°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	170°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.57 inches Hg	Temperature/Dew Point:	-11°C / -21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Duluth, MS (DLH)	Type of Flight Plan Filed:	None
Destination:	Superior, WI (SUW)	Type of Clearance:	VFR flight following
Departure Time:	16:03 Local	Type of Airspace:	Class E

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	46.722786,-92.149062(est)

The airplane impacted nose-down on top of a frozen river. A debris path was oriented on a magnetic heading of about 135°, extending about 300 ft. The empennage was located intact at the beginning of the debris path. Scattered pieces of composite airframe were noted along the debris path with the engine and instrument panel at the end of the path. The Cirrus Aircraft Parachute System was observed deployed consistent with ground impact. The rudder was removed to facilitate access and removal of the RDM. Data from the RDM were successfully downloaded at the accident site.

The wreckage was further examined following its recovery to a storage facility. The examination identified the fore/aft and left/right extreme end components of the airplane. The empennage remained intact. The forward cockpit section and instrument panel were destroyed but identified. Both wing ailerons and flaps had separated from their respective wing and were identified. Rudder and elevator control cables extended forward from the empennage through the ice and were cut by recovery personnel to free the empennage. Aileron control

cable continuity was confirmed from both ailerons through the cable breaks, which were consistent with overstress, to the cockpit area. The flaps jackscrew was not recovered, but RDM data indicated that they were retracted. The elevator pitch trim motor was found in the full nose-up trim position.

According to the pitch trim servo manufacturer (Garmin), impact damage and water immersion precluded functional testing of the pitch trim servo.

Examination of the wreckage and RDM data did not reveal evidence of any preimpact mechanical malfunctions.

Flight recorders

Data from the RDM were forwarded to the National Transportation Safety Board Vehicle Recorders Laboratory, Washington, DC for further examination. Review of the data revealed that the model RDM did not record pitch trim position, autopilot disconnect button activation, pitch trim hat movements, or auto trim commands. However, during the 1-minute period prior to autopilot disconnect, the autopilot was in approach mode, using glidepath (GP) for vertical guidance and GPS for lateral guidance. With GP active, the vertical deviation slowly started to decrease until the final recorded vertical deviation was -952 ft. This would have resulted in the autopilot trimming nose-up to counteract the negative vertical deviation. After autopilot manual disconnect and the final descent, the ESP pitch mode activated and stayed active for the remainder of the recording. The ESP pitch protection mode would normally activate when the airplane reached the pitch engagement limit (in this case, -15.5° nose-down pitch) and the system would then command the servos to apply a supplemental stick force back toward the nominal pitch attitude range. The supplemental stick force would increase with increasing pitch deviation until the maximum limit (in this case, -20.5° nose-down pitch) was reached.

The airframe manufacturer estimated that about 40 lbs of forward force would be required on the control stick to override both the ESP and the as-found nose-up trim condition (about 15 lbs and 24 lbs respectively) in order to maintain a 30° descent angle to impact. The final RDM data point was recorded at 1607:50. It indicated that the airplane was at a pressure altitude of 370 ft, an indicated airspeed of 175 knots, and descending at a vertical speed of -6,880 ft-per-minute. The engine rpm was 2,523 rpm with 10.9 inches of manifold pressure.\

Further review of the data revealed that the yaw damper (which automatically engages above 200 ft above ground level, disengaged when the autopilot disengaged, consistent with a manual autopilot disengagement. The yaw damper will automatically reengage as long as the airplane is above 200 ft, which occurred 3 seconds before impact.

Medical and Pathological Information

An autopsy was conducted on the pilot by the Anoka County Office of The Chief Medical Examiner, Ramsey, Minnesota. The cause of death was "multiple blunt force injuries" and the manner of death was "accident." Toxicological testing of the pilot's specimens was conducted by the FAA Office of Forensic Sciences, Oklahoma City, Oklahoma. The results were negative for drugs and alcohol, with the exception of acetaminophen (Tylenol) detected in blood and urine.

Autopsy evaluation for natural disease was limited by the severity of injuries; the brain was unavailable for examination and structural evaluation of the heart was limited by injury. The visible coronary arteries demonstrated mild to moderate narrowing by plaque. Within the limitations of the autopsy, no other significant natural disease was identified.

Administrative Information

Investigator In Charge (IIC):	Gretz, Robert
Additional Participating Persons:	Greg Thurston; FAA/FSDO Brannon Mayer; Cirrus Aircraft; Duluth, MN
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Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=106783

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