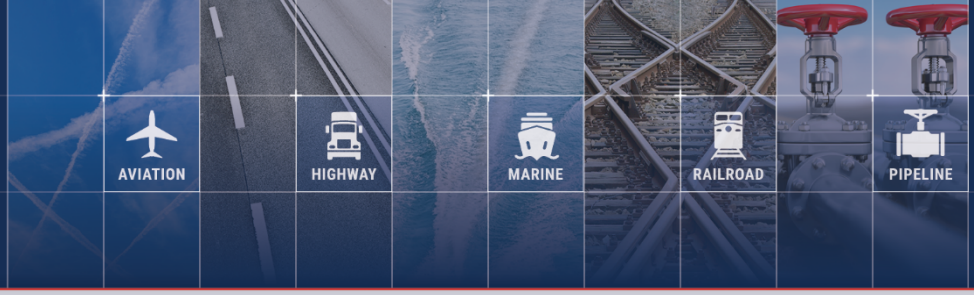

Aviation Investigation Final Report

Location:	Saint Cloud, Florida	**Accident Number:**	ERA22LA404
Date & Time:	September 9, 2022, 15:02 Local	**Registration:**	N77VJ
Aircraft:	CIRRUS DESIGN CORP SF50	**Aircraft Damage:**	Substantial
Defining Event:	Windshear or thunderstorm	**Injuries:**	2 Minor, 1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot obtained multiple preflight weather briefings that resulted in him delaying the flight's departure until the afternoon. After departure, while near his intended destination, the pilot was twice advised by air traffic controllers of adverse weather, including heavy to extreme precipitation along the intended final approach.

While in visual meteorological conditions the pilot requested an RNAV approach to his destination airport. While flying towards the final approach fix at a low thrust setting the autopilot attempted to maintain 2,000 ft while pitching up and slowing to about 100 knots, causing an airspeed aural warning. The pilot applied partial thrust and while in instrument meteorological conditions the flight encountered extreme precipitation and turbulence associated with the previously reported thunderstorm. The pilot turned off the autopilot; the airplane then climbed at a rate that was well beyond the performance capability of the airplane, likely caused by updrafts from the mature thunderstorm and application of takeoff thrust. The High Electronic Stability & Protection (ESP) engaged, pitching the airplane nose-down coupled with the pilot pushing the control stick forward. The airplane then began descending followed by pitching up and climbing again. The pilot pulled the Cirrus Airframe Parachute System (CAPS) and descended under canopy into a marsh but the airplane was dragged a short distance from wind that inflated the CAPS canopy.

Postaccident examination of the recovered airplane revealed substantial damage to the front pressure bulkhead and to both sides of the fuselage immediately behind the front pressure bulkhead. There was no evidence of preimpact failure or malfunction of the flight controls for roll, pitch, or yaw.

Data downloaded from the Recoverable Data Module (RDM) revealed no faults with the autopilot or stability protection systems until the CAPS system was activated, when those recorded faults would have been expected. Further, there were no discrepancies with the engine. Although the pilot perceived a malfunction of the autopilot at several times during the final portion of the flight, the perceived autopilot discrepancies were likely normal system responses based on the autopilot mode changes.

Probable Cause and Findings

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

The pilot's continuation of the instrument approach into known extreme precipitation and turbulence associated with a thunderstorm, resulting in excessive altitude deviations that required him to activate the Cirrus Airframe Parachute System.

Findings

Environmental issues	Convective turbulence - Awareness of condition
Environmental issues	Thunderstorm - Awareness of condition
Personnel issues	Decision making/judgment - Pilot

Factual Information

History of Flight

Approach-IFR initial approach	Windshear or thunderstorm (Defining event)
Approach-IFR initial approach	Turbulence encounter
Approach-IFR initial approach	Altitude deviation
Approach-IFR initial approach	Attempted remediation/recovery
Approach-IFR initial approach	Miscellaneous/other

On September 9, 2022, about 1502 eastern daylight time, a Cirrus Design Corporation SF50, N77VJ, was substantially damaged when it was involved in an accident near Saint Cloud, Florida. The private pilot and one passenger sustained minor injuries and one passenger was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* (*CFR*) Part 91 personal flight.

The pilot stated that his preflight preparation included obtaining the weather forecast the day before the accident and the morning of the flight. After arrival at the airport, he reviewed the flight plan and again reviewed the weather, electing to depart in the afternoon. Before departure, he provided a passenger safety briefing. The pilot departed Miami-Opa Locka Executive Airport (OPF), Miami, Florida, at 1412, destined for Kissimmee Gateway Airport (ISM), Orlando, Florida. While enroute, he maintained contact with several Federal Aviation Administration (FAA) air traffic control facilities as appropriate. Before arrival at ISM, the pilot reported he obtained the automated terminal information service, which indicated light rain and cloud ceilings at 4,600 and 3,800 ft.

Data downloaded from the on-board RDM correlated with a transcription of communications of air traffic control facilities, pilot interview, and FAA Chronological Summary of Flight Communications indicated that at 1448:34, when the flight was about 35 nautical miles east-southeast of ISM, the pilot was advised of heavy to extreme precipitation over the final approach for runway 33. The controller also asked the pilot if he wanted to continue to ISM or if he had an alternate. The pilot replied that he would continue to ISM, then at 1450:36, while in contact with the Central Florida TRACON facility Satellite Radar Disney position, the controller advised the pilot of scattered heavy precipitation starting at 10 o'clock and 10 miles extending all the way to ISM. The accident pilot acknowledged the transmission and informed the controller that he wanted the RNAV Runway 33 approach, later reporting that the flight at that time was in visual meteorological conditions.

After being instructed by the controller to proceed direct to waypoint AXMEB (intermediate fix for the RNAV [GPS] Runway 33 approach), the airplane turned to a heading that would have

taken it direct to that waypoint. However, at 1455:04, when the flight was about 10 nautical miles east-southeast of that waypoint, the autopilot-coupled lateral mode was changed to heading mode and the airplane turned slightly to the right, flying on a westerly heading that the pilot later reported as being uncommanded. While on that heading, about 1457, the airplane began descending on autopilot to 2,000 ft and the pilot established contact with ISM air traffic control tower. The flight flew north of AXMEB, and during this portion of the descent the airspeed increased to 208 knots until the thrust lever angle (TLA) was reduced from +9° to -9°. The airplane continued on the westerly heading, then turned right after the autopilot-coupled lateral mode was changed to NAV GPS, capturing the final approach course for runway 33. The pilot later stated that the right turn surprised him and was unexpected, attributing it to be a malfunction of the autopilot. The airplane flew towards LOJUF, a waypoint identified as the final approach fix, while descending to 2,000 ft.

After reaching 2,000 ft with the thrust lever remaining at -9° (recorded range -22° to +38°), the airplane nose-up (ANU) pitch increased while the indicated airspeed decreased to a low of 100 knots, which surprised the pilot because of the airplane configuration; he reported that he did not expect that airspeed for that phase of the approach. He also reported hearing an airspeed aural warning, prompting him to "… put more power." At 1459:21, with the autopilot still engaged, the airplane started pitching down from 12.8° ANU to 1.8° ANU. In the final second of autopilot operation, at 1459:26, the airplane was about 3° ANU and about 1° right bank attitude, flying at an indicated airspeed of 110 knots. Then, at 1459:27 when the autopilot was fully disconnected, the airplane was in a left bank of about 7°. The pilot later reported that the control stick was centered at the time the autopilot was disconnected.

Variation in pitch and roll followed the autopilot disconnect and the TLA continued to increase until reaching +38°, consistent with the takeoff setting. The airplane pitched up, gaining 1,498 ft between 1459:39 and 1459:56, which corresponded to an average calculated rate of climb of about 4,993 feet-per-minute. The ESP engaged, pitching the airplane nose down at 1459:47 while at 28° ANU pitch, supplemented by the pilot who reported pushing the control stick. The airplane began pitching down followed by pitching up again with a corresponding increase in altitude. While in instrument meteorological conditions, the pilot informed the passengers that he would be deploying the Cirrus Airframe Parachute System (CAPS), verified they were strapped in, and told them to remain so.

The pilot pulled the CAPS handle at 1459:55 while flying at 3,150 ft pressure altitude, in a left roll of about 45°, with an airspeed of 119 knots and about 2° ANU pitch. The CAPS fully deployed, and the airplane descended under the canopy into a marsh. Following ground contact, the airplane flipped upside down. The pilot and the rear-seat passenger exited the airplane, but the right front seat occupant did not exit the airplane until after it was dragged about 300 ft from wind that inflated the CAPS canopy.

The RDM recording continued until it lost power about an hour after the accident. There were no recorded faults identified in the autopilot or stability protection systems until the CAPS

system was activated, when those recorded faults would have been expected. Further, no discrepancies were identified with the engine.

Pilot Information

Certificate:	Private	**Age:**	57,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	July 24, 2020
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	December 1, 2021
Flight Time:	982 hours (Total, all aircraft), 325 hours (Total, this make and model), 7 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft)		

The pilot completed recurrent training on November 30, 2021, flying 7.1 hours that consisted of 3 flights, including a check ride in a SF50 fixed training device. He completed all training and passed his checkride on the first attempt. He attained a score of 96% on the examination and accrued a total of 3.5 hours of pre- and post-ground discussion.

He reported having about 325 hours total time in the airplane, of which 192 were as pilot-in-command.

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N77VJ
Model/Series:	SF50 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2018	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	0088
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	January 31, 2022 Annual	**Certified Max Gross Wt.:**	6000 lbs
Time Since Last Inspection:	139 Hrs	**Engines:**	1 Turbo fan
Airframe Total Time:	645 Hrs at time of accident	**Engine Manufacturer:**	Williams
ELT:	C126 installed, activated	**Engine Model/Series:**	FJ33-5A
Registered Owner:	On file	**Rated Power:**	1846 Lbs thrust
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was equipped with Garmin GWX 7X weather radar, a GDL 69A SiriusXM Satellite Weather & Radio Data Link receiver, and a GSR 56 Iridium Transceiver. The weather radar displayed real-time information on the “flight displays”; the SiriusXM Weather Data Link receiver received and transmitted real-time weather information on the primary flight display (PFD) and multifunction display (MFD). The GSR 56 Iridium Transceiver received and transmitted real-time weather information to the PFD and MFD, including NEXRAD Radar on the MFD. The pilot reported during a postaccident interview that the systems were fully functional during the accident flight, but he relied solely on the weather radar display from SiriusXM.

The airplane’s last altimeter, static system, transponder, and altitude reporter tests, required by 14 *CFR* Part 91.411 and 91.413, were completed on January 4, 2021.

Cirrus Aircraft, who was a party to the investigation, provided the NTSB with an engineering analysis of the performance of the airplane at the end of the flight based on environmental, loading conditions, and thrust capability. The document indicated that the expected climb performance at 2,000 ft was 1,971 feet-per-minute, or 591 ft in 18 seconds.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KISM,82 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	14:56 Local	**Direction from Accident Site:**	326°
Lowest Cloud Condition:		**Visibility**	6 miles
Lowest Ceiling:	Broken / 3600 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	17 knots / 20 knots	**Turbulence Type Forecast/Actual:**	Convective / Convective
Wind Direction:	230°	**Turbulence Severity Forecast/Actual:**	Extreme / Extreme
Altimeter Setting:	29.85 inches Hg	**Temperature/Dew Point:**	27°C / 23°C
Precipitation and Obscuration:	Heavy - None - Rain		
Departure Point:	Miami, FL (OPF)	**Type of Flight Plan Filed:**	IFR
Destination:	Orlando, FL (ISM)	**Type of Clearance:**	IFR
Departure Time:	14:12 Local	**Type of Airspace:**	Class B

At 1325, or about 47 minutes before the flight departed, the National Weather Service (NWS) issued a Terminal Aerodrome Forecast for ISM for the accident time. The forecast called for wind from 130° at 9 knots, visibility greater than 6 statute miles, thunderstorms in the vicinity, or within 5 to 10 miles of the aerodrome, scattered clouds at 4,500 ft above ground level (agl) of cumulonimbus type, ceiling broken at 12,000 ft agl. Temporary conditions between 1400 and 1800 were forecast to be: visibility of 3 statute miles, thunderstorms with moderate rain, ceiling broken at 2,500 ft agl with clouds of cumulonimbus type.

At 1435, or about 23 minutes after the flight departed, the NWS Center Weather Service Unit at the Miami Air Route Traffic Control Center issued a Center Weather Advisory (CWA) that was active for the accident location and was valid until 1535. That CWA advised of an area of developing thunderstorms with heavy to extreme precipitation for the accident site location.

At 1455, or about 7 minutes before the accident, the NWS Aviation Weather Center issued Convective SIGMET 51E valid for the accident location until 1655, advising of an area of thunderstorms.

The remarks section of the 1456 METAR from ISM reported in part that rain began at 1451 and thunderstorm began at 1454.

A weather radar image revealed the airplane’s flight path terminated amidst “extreme” values of precipitation. In that situation the actual turbulence encountered due to convective activity would also have been extreme.

According to FAA Advisory Circular (AC) 00-24C, Thunderstorms, “All thunderstorms have conditions that are a hazard to aviation. These hazards occur in numerous combinations. While not every thunderstorm contains all hazards, it is not possible to visually determine which hazards a thunderstorm contain.” The mature stage of a thunderstorm can contain updrafts and downdrafts within them. The AC also indicates that thunderstorms may contain tornadoes, icing, hail, and lightning, and that thunderstorms should be avoided by “…at least 20 miles….”

Airport Information

Airport:	Kissimmee Gateway ISM	**Runway Surface Type:**	
Airport Elevation:	82 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	Global positioning system;RNAV
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor, 1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Minor, 1 None	**Latitude, Longitude:**	28.204722,-81.3725

The airplane descended into a marshy area behind a house. The accident site was located about 5.6 nautical miles and 146° from the approach end of runway 33.

Examination of the recovered airplane revealed the front pressure bulkhead was damaged in multiple areas; both sides of the fuselage immediately aft of the front pressure bulkhead were also damaged, resulting in large openings.

Examination of the flight controls following airplane recovery revealed control continuity for roll, pitch, and yaw from the cockpit to each control surface except for controls that exhibited overload failure in the cockpit or were cut for recovery. The vertical pitch/pull rod in the cockpit behind the instrument panel and the co-pilot control joystick pitch push/pull tube both

exhibited overload failure with no evidence of preimpact failure or malfunction. The right flap was observed retracted, which coincided with the flap selector position.

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Michael Tremblay; FAA/FSDO; Orlando, FL Brad Miller; Cirrus Aircraft; Duluth, MN
Original Publish Date:	September 18, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=105897