Aviation Investigation Final Report

Location:	Pewaukee, Wisconsin	**Accident Number:**	CEN23LA037
Date & Time:	November 15, 2022, 15:00 Local	**Registration:**	N247DH
Aircraft:	Fairchild SA227-AT	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	2 Minor, 1 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The flight crew reported that while on an instrument landing system (ILS) approach with the autopilot system engaged in approach mode, they noticed that the airplane flight director indicated a climbing right turn but the airplane was still tracking the localizer and glideslope. The airplane's ice protection was on, and no visible ice had accumulated. They reported that they disconnected the autopilot, and the airplane suddenly rolled to the right. They attempted to regain control by increasing engine power and applying counteractive control inputs, but the airplane impacted the ground in a near-wings-level attitude.

Examination of the airplane's primary flight control system and engines after the accident did not reveal any defects. The rudder trim was neutral, and the pitch trim was airplane nose up. Aileron trim could not be determined.

Examination of the airplane's autopilot components revealed deficiencies in the yaw damper system that rendered it inoperative; however, on the accident airplane the yaw damper system was an optional component and was not necessary for airplane operation. Testing of the remaining autopilot components revealed some deficiencies that could have degraded performance but would not have resulted in a complete failure of the automatic flight control system.

A performance study based on ADS-B data showed that the airplane intercepted the localizer and glideslope for the ILS approach and was descending in a level attitude. While maintaining the ILS approach guidance, the airplane slowed below the 130 knots (kts) airspeed that the crew stated was the desired approach speed. The airspeed continued to slow to about 102 kts when the ADS-B data indicated that the airplane rolled slightly to the right, likely corresponding to the flight crew's description of events after they disconnected the autopilot. The airplane

continued to slow below 100 kts and the airplane was at a bank angle of 27° right wing down. Subsequently, the descent rate increased to over 4,000 ft/min and airspeed increased while groundspeed remained between 80 and 90 kts. The airplane rolled sharply to the left. The sudden roll and loss of altitude after reaching a low airspeed was consistent with an aerodynamic stall.

Based on the available evidence, the airplane entered an inadvertent aerodynamic stall due to exceedance of the critical angle of attack after the flight crew allowed the airspeed to decay during the instrument approach. Although an unknown anomaly in the flight director system could have resulted in the crew becoming fixated on an errant flight director indication at the expense of airspeed control, the postaccident component examination was not able to explain the errant flight director indication that the flight crew described.

Probable Cause and Findings

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

The flight crew's failure to maintain adequate airspeed and their exceedance of the airplane's critical angle of attack during the instrument approach, which resulted in an aerodynamic stall. Contributing to the accident was an undetermined anomaly in the airplane flight director system which resulted in the flight crew likely becoming fixated on the anomaly at the expense of airspeed control.

Findings

Aircraft	Attitude & direction - Unknown/Not determined
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Capability exceeded
Personnel issues	Identification/recognition - Flight crew

Factual Information

History of Flight

Approach-IFR final approach	Loss of control in flight (Defining event)

On November 15, 2022, about 1500 central standard time, a Fairchild SA227-AT airplane, N247DH, was substantially damaged when it impacted the ground near Pewaukee, Wisconsin. Both flight crew members received minor injuries, and the passenger was not injured. The flight was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 135 as an on-demand cargo flight.

The flight crew reported that during the climb after departure, and during the cruise portion of the flight they occasionally experienced a momentary right yaw of the airplane. They determined that even though they experienced an occasional momentary yaw that the yaw damper system was otherwise operating and not interfering with other systems, so they elected to leave the yaw damper engaged.

The airplane was on an ILS approach to runway 10 at the Waukesha County Airport (UES) when the accident occurred. After air traffic control (ATC) had cleared them for the approach the airplane intercepted the localizer and glideslope. During the approach, the flight crew noticed that the command bars on the airplane's flight director were indicating a climbing right turn. According to the flight crew, at that time, the autopilot was in approach mode and was still tracking the localizer and glideslope, airspeed was about 135 kts and not trending up or down significantly, and everything except the flight director looked to be normal.

The flight crew decided to disconnect the autopilot and continue the approach, and manually fly the airplane for the remainder of the flight. The crew reported that once the autopilot was disconnected, the airplane immediately rolled to the right. Both pilots got on the controls and increased engine power to attempt to regain control of the airplane. They were able to level the airplane; however, it impacted the ground in a near-wings-level attitude.

During the accident sequence the airplane contacted trees, separating the wings from the airplane and resulting in substantial damage to the wings and fuselage.

Figure 1: The airplane at the accident site. (Photo courtesy of FAA)

Examination of the airplane after the accident showed that the airplane's flight control system was intact except for breaks attributable to the impact sequence. The airplane was equipped with manual trim only for yaw and roll. Electric trim was available for pitch, which moved the leading edge of the horizontal stabilizer up or down as necessary. The rudder trim tab was found in a neutral position. The horizontal stabilizer's leading edge was down, near the maximum trim marking on the vertical stabilizer, indicating nose up trim. The aileron trim was not determined due to the damage to the airplane's wings. The airplane's engines were free to rotate and no preimpact anomalies were detected. Further engine examination was not performed, and the flight crew did not claim any engine operation issues during interviews.

The airplane's autopilot components and navigation receivers were removed from the airplane for testing. Although the accident airplane was equipped with a yaw damper system, the system was optional and was not necessary for aircraft operation. Examination of the yaw damper servo revealed that the clutch would not engage, yielding the yaw servo inoperable. Additionally, the yaw damper computer was not receiving signals from its internal accelerometer. This would result in the yaw damper computer interpreting that the airplane

was always in coordinated flight. As a result, the output signal from the yaw damper computer remained constant in the neutral position.

Testing of the remaining avionics components revealed some parameters that were outside of test specifications that could have degraded performance but would not have resulted in a failure of the automatic flight control system.

The airplane did not have a cockpit voice recorder or flight data recorder. None of the avionics had capability for recording flight parameters. ADS-B data showed that the airplane took off from New Orleans Lakefront Airport (NEW) at 1204, climbed to near 20,000 ft, and flew north. About 1440, the airplane began to descend toward UES.

A performance study of the ADS-B data showed that at 1458:15, while at an altitude of 2,160 ft and an airspeed of 192 kts, the airplane turned inbound on the localizer for runway 10 at UES. At 1459:00 the airplane slowed below 160 kts airspeed, which the crew reported in interviews was the minimum speed for flight in icing conditions. The flight crew reported that ice protection was on and that no visible ice had accumulated. At 1459:07, the airplane began descending along the ILS glideslope for runway 10 to UES. At 1459:14, the airplane slowed through 130 kts, the selected approach speed according to crew statements. The airplane continued to descend along the glideslope and localizer while slowing, reaching an airspeed of 102 kts by 1459:28.The performance study showed that after capturing the runway heading and glideslope, the airplane was descending in a level attitude.

At 14:59:28 the airplane descended below the glideslope while beginning a slight turn to the right, likely corresponding with the flight crew's description of events that occurred after disconnecting the autopilot. Initially, the airplane's descent rate was a steady 1,500 ft/min while the airspeed continued to slow. By 14:59:34, the airspeed was below 100 kts and the airplane was at a bank angle of 27° right wing down. Subsequently, the descent rate increased to over 4,000 ft/min and airspeed increased while groundspeed remained between 80 and 90 kts. The airplane rolled sharply to the left. The sudden roll and loss of altitude after reaching a low airspeed was consistent with aerodynamic stall.

At 1459:46, the airplane altitude was 1,260 ft, which was about 400 ft above ground level. The final two data points indicate that the descent rate had been slowed and the wings were near level, which was consistent with the airplane's orientation when it impacted the ground as well as the description from the flight crew.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	26,Male
Airplane Rating(s):	Single-engine land; Multi-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 Without waivers/limitations	**Last FAA Medical Exam:**	November 4, 2021
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	2848 hours (Total, all aircraft), 130016 hours (Total, this make and model), 2148 hours (Pilot In Command, all aircraft), 176 hours (Last 90 days, all aircraft), 57 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial	**Age:**	51,Male
Airplane Rating(s):	Single-engine land; Multi-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:**	
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	October 28, 2022
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	1320 hours (Total, all aircraft), 530527 hours (Total, this make and model), 712 hours (Pilot In Command, all aircraft), 37 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Fairchild	**Registration:**	N247DH
Model/Series:	SA227-AT	**Aircraft Category:**	Airplane
Year of Manufacture:	1985	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	AT-626B
Landing Gear Type:	Retractable - Tricycle	**Seats:**	12
Date/Type of Last Inspection:	November 11, 2022 AAIP	**Certified Max Gross Wt.:**	16000 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo prop
Airframe Total Time:	29256 Hrs at time of accident	**Engine Manufacturer:**	Garrett
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	TPE331-11U-611G
Registered Owner:	UAS TRANSERVICES INC	**Rated Power:**	1650 Horsepower
Operator:	UAS TRANSERVICES INC	**Operating Certificate(s) Held:**	On-demand air taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KUES,911 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	14:45 Local	**Direction from Accident Site:**	124°
Lowest Cloud Condition:		**Visibility**	0.5 miles
Lowest Ceiling:	Overcast / 300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	60°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.25 inches Hg	**Temperature/Dew Point:**	-1°C / -1°C
Precipitation and Obscuration:	Light - None - Snow		
Departure Point:	New Orleans, LA (NEW)	**Type of Flight Plan Filed:**	IFR
Destination:	Waukesha, WI (UES)	**Type of Clearance:**	IFR
Departure Time:	12:04 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	WAUKESHA COUNTY UES	**Runway Surface Type:**	Concrete
Airport Elevation:	911 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	10	**IFR Approach:**	ILS
Runway Length/Width:	5849 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Minor, 1 None	**Latitude, Longitude:**	43.041028,-88.237056(est)

Administrative Information

Investigator In Charge (IIC):	Brannen, John
Additional Participating Persons:	Michael Dziengel; FAA; Milwaukee, WI Pat Kremer; Ameriflight; Dallas, TX Julie Segal; Collins Aerospace; Cedar Rapids, IA
Original Publish Date:	January 29, 2025
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=106296