National Transportation Safety Board
Aviation Accident Final Report

Location:	Orleans, Indiana	**Accident Number:**	CEN19FA195
Date & Time:	June 30, 2019, 20:45 Local	**Registration:**	N1094K
Aircraft:	RANS S12	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The student sport pilot was conducting a local solo flight near his private airstrip in calm wind conditions, and had performed two or three landings before the accident flight. A camera located near the airstrip captured a segment of the accident flight, during which the airplane could be seen spiraling downward and impacting the runway, followed by a postimpact fire. A witness reported that he heard the accident airplane fly over on the night of the accident. He heard the engine "die," but stated that it subsequently restarted, and the airplane proceeded directly toward the runway. The witness subsequently heard the sound of the impact and saw the fire.

The airplane impacted terrain in a nose-down attitude. No preimpact structural or flight control continuity were detected during a postaccident examination. Thermal damage precluded a thorough examination of the propeller and engine. A Federal Aviation Administration Advisory Circular (AC 90-109A) classified the airplane as a low-inertia, high-drag airplane. These airplanes are particularly susceptible to unintentional aerodynamic stalls due to their low cruise speed to stall speed margin and their tendency to experience significant airspeed decay with increased load factor (such as during a turn). Based on the available information, it is likely that while maneuvering toward the runway following the loss of and restoration of engine power, the pilot exceeded the airplane's critical angle of attack, which resulted in an inadvertent aerodynamic stall and loss of control.

Although medical records indicated that the pilot had been treated for an unspecified anxiety disorder for many years, whether effects from the disorder or its treatment contributed to the accident could not be determined given the available evidence.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's exceedance of the airplane's critical angle of attack while maneuvering toward the runway, which resulted in an aerodynamic stall and a loss of control.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Angle of attack - Capability exceeded

Factual Information

History of Flight

Maneuvering	Aerodynamic stall/spin (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On July 1, 2019, about 2045 eastern daylight time, an experimental amateur-built Rans S12 airplane, N1094K, was substantially damaged when it was involved in an accident near Orleans, Indiana. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

A Federal Aviation Administration (FAA) inspector reported that the pilot had performed two or three landings before the accident flight. A camera located near the runway captured a segment of the accident flight showing the airplane spiraling downward and impacting the runway, followed by a postimpact fire.

After the accident, a neighbor who lived near the airstrip advised a family member of the pilot's that he heard the airplane fly over his barn on the night of the accident. He heard the motor "die," then walked out of the barn. The witness stated that the motor restarted and the airplane proceeded straight toward the runway. He then heard the crash and observed the fire.

Pilot Information

Certificate:	None	**Age:**	42,Male
Airplane Rating(s):	None	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Sport pilot	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	21.3 hours (Total, all aircraft), 19.2 hours (Total, this make and model)		

The pilot had received flight training toward a sport pilot certificate and had received a flight instructor's endorsement on September 26, 2018, indicating a "solo check" in the accident airplane.

Aircraft and Owner/Operator Information

Aircraft Make:	RANS	**Registration:**	N1094K
Model/Series:	S12	**Aircraft Category:**	Airplane
Year of Manufacture:	2012	**Amateur Built:**	No
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	10942012
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	975 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Rotax
ELT:		**Engine Model/Series:**	582
Registered Owner:		**Rated Power:**	
Operator:	On file	**Operating Certificate(s) Held:**	None

According to his wife, the pilot purchased the airplane from someone she thought was in Michigan. However, there was no FAA record of the purchase, and the listed prior owners were not able to be located.

According to the pilot's flight instructor, the airplane was not equipped with a stall warning indicator or an angle of attack indicator.

FAA Advisory Circular 90-109A, Transition to Unfamiliar Aircraft, in part, characterizes the Rans S12 as one of a group of low-inertia and/or high-drag airplanes, which "rapidly lose energy (airspeed and/or altitude) when there is a loss or reduction of power." These types of airplanes may also experience significant airspeed decay with increased load factor, such as during turns, making them "particularly susceptible to unintentional stalls," especially given their low cruise speed to stall speed margin.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	FRH,792 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	20:15 Local	**Direction from Accident Site:**	225°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	28°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Paoli, IN (I42)	**Type of Flight Plan Filed:**	None
Destination:	Paoli, IN (I42)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Airport Information

Airport:	Private PVT	**Runway Surface Type:**	
Airport Elevation:	650 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	38.628055,-86.47583

The airplane came to rest on its nose oriented on a magnetic heading about 135° on the west edge of a north/south oriented private airstrip near its north end. Grass and corn near the airplane exhibited blight and charring consistent with a ground fire. The fabric wing skins and upper fuselage were consumed by fire. The engine and its propeller exhibited discoloration, deformation, and consumption consistent with fire damage. All separations exhibited

appearances consistent with overload or deformation consistent with thermal damage. No preimpact structural anomalies were detected. Flight control continuity was traced from the cockpit area to the flight control surfaces. Bolts holding the propeller hub halves were in place and no visible cracking was observed on the hubs; however, due to thermal damage of the propeller blades, it could not be determined if the blades' collars had rotated between the hub halves. The engine could not be rotated by hand due to the thermal damage.

Medical and Pathological Information

The Lawrence County Forensic Services Center conducted an autopsy on the pilot. The cause of death was listed as head, chest, and abdominal injuries. No significant natural disease was identified.

Toxicology testing performed by the FAA Forensic Sciences Laboratory detected Amino-clonazepam, Sertraline, and Desmethylsertraline in blood and urine.

Sertraline is an antidepressant used to treat depression and anxiety disorders and is not known to be directly impairing. Desmethylsertraline is a metabolite of sertraline. Amino-clonazepam is a metabolite of clonazepam, which produces central nervous system depression. The parent compound, clonazepam, was not present.

According to medical records obtained from the pilot's family physician for the three years preceding the accident, the pilot had been treated with sertraline and clonazepam for an unspecified anxiety disorder for many years. He had no other significant medical conditions diagnosed.

Administrative Information

Investigator In Charge (IIC):	Malinowski, Edward		
Additional Participating Persons:	Drew Holmes; Federal Aviation Administration; Indianapolis, IN		
Original Publish Date:	December 3, 2020	**Investigation Class:**	2
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=99748		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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