Aviation Investigation Final Report

Location:	Anderson, Indiana	**Accident Number:**	CEN19FA135
Date & Time:	May 5, 2019, 08:30 Local	**Registration:**	N999CR
Aircraft:	Piper PA34	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot planned to ferry the twin-engine airplane to another airport for the annual maintenance inspection. Several witnesses saw the airplane's departure. Two of the witness reported that the airplane engines didn't sound "normal". Several witnesses reported that the airplane appeared to pitch up, before stalling.

A video from the airport's security camera revealed that the airplane appeared to climb steeply; the airplane's wings rocked back-and-forth, and the airplane disappeared out of view. When the airplane reappeared in the camera's view, the airplane was in a descent with the left wing low. The airplane collided with terrain and the airplane cabin area was largely destroyed by the impact.

Examination of the airplane found the stabilator trim actuator screw was near its maximum nose up setting. The left engine was removed from the airframe and tested in the engine manufacturers test cell. The engine test run reveled the engine did not produce full rated horsepower and on occasions produced black exhaust which was indicative of a rich fuel air mixture. The fuel servo was replaced with a new unit and the engine was able to produce rated horsepower. Further examination of the original fuel servo showed that the control linkage (rod and link assembly), was installed incorrectly.

The accident is consistent with loss of power on the left engine due to an incorrectly installed fuel servo and an excessive nose up trim setting, which resulted in steep climb angle, a loss of airspeed, and an aerodynamic stall.

Probable Cause and Findings

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

The loss of left engine power due to an incorrectly adjusted fuel servo and the airplane's nose up trim which resulted in the airplane steep climb, loss of airspeed, and aerodynamic stall and subsequent impact with terrain.

Findings

Aircraft	Fuel controlling system - Malfunction
Aircraft	Aileron tab control system - Incorrect use/operation
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Capability exceeded
Personnel issues	(general) - Not specified
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Initial climb	Loss of engine power (partial)
Initial climb	Aerodynamic stall/spin (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

On May 5, 2019, about 0830 eastern daylight time, a Piper PA-34-220T airplane, N999CR impacted terrain shortly after departing the Anderson Municipal Airport-Darlington Field (AID) Anderson, Indiana. The pilot received serious injuries, and the airplane was substantially damaged. The airplane was registered to and operated by SPC Leasing, LLC, as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

Several witnesses saw the airplane airborne after its departure from runway 36. A couple of the witness reported that the airplane engines didn't sound "normal". Several witnesses reported the airplane appeared to pitch up, before stalling.

A review of the airport security video that captured the airplane's departure revealed that the airplane appeared to climb steeply and the wings rocked back-and-forth before the airplane disappeared out of view. When the airplane reappeared in the camera's view, it was in a descent with the left wing low. The airplane impacted terrain and came to rest facing opposite of the direction of travel.

Pilot Information

Certificate:	Commercial	**Age:**	69
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	June 1, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	100 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N999CR
Model/Series:	PA34 220T	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	3449143
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:	July 7, 2017 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	27.8 Hrs	**Engines:**	Reciprocating
Airframe Total Time:	1819.3 Hrs at time of accident	**Engine Manufacturer:**	Continential
ELT:	C91A installed	**Engine Model/Series:**	TSIO-360
Registered Owner:		**Rated Power:**	
Operator:		**Operating Certificate(s) Held:**	None

A review of the airplane's maintenance records revealed that the airplane's last annual inspection was conducted on July 7, 2017. The purpose of the flight was to ferry the airplane to Huntington, Municipal Airport (HHG), in order to have an annual inspection completed. The airplane was issued a temporary ferry permit on February 22, 2019, valid for 10 days, to relocate the airplane to HHG.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	AID,919 ft msl	**Distance from Accident Site:**	
Observation Time:	08:35 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	20°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.9 inches Hg	**Temperature/Dew Point:**	9°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Anderson, IN (AID)	**Type of Flight Plan Filed:**	None
Destination:	Huntington, IN (HHG)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	ANDERSON MUNI-DARLINGTON FIELD AID	**Runway Surface Type:**	Asphalt
Airport Elevation:	919 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	36	**IFR Approach:**	None
Runway Length/Width:	3399 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	40.108612,-85.613052(est)

The front of the airplane cabin/cockpit area was destroyed by the impact, and the major airplane components were located at the crash site. The outer section of the left wing was located near the initial impact point and the remaining part of the left wing was attached to the fuselage by electrical wires. The right wing remained attached to the fuselage. There was not a post-crash fire.

The airplane was examined on scene by the National Transportation Safety Board investigator-in-charge, and technical representatives from the engine and airframe manufacturers. Control cable continuity was established from the cockpit to the stabilator and rudder. Aileron cable continuity was continuous from the cockpit to the right aileron. The left aileron cable and the balance cable had separated inside of the cabin. Both cables exhibited "broomstraw" signatures, consistent with tension overload.

The flap actuator screw position corresponded to a 0° (flaps retracted) setting. The fuel valves located in each wing were in the "on" position. The electric fuel pumps were connected to a battery and tested for operation. An estimated 35 to 40 gallons of fuel was recovered from the right-wing fuel tanks. The left fuel tanks appeared to have been breached during the accident, and a fuel smell was present on site. The landing gear handle and landing gear were in the "up" or retracted position.

The rudder trim actuator screw corresponded to a partial tab deflection to the right (aircraft nose left) setting. The stabilator trim actuator screw was extended about 0.5 inch aft from the barrel, which corresponded to nose up trim setting and 0.05 from maximum travel. An inspection of the pilot's pitch trim indicator revealed a slight nose up indication. The examination was unable to determine if the indicator was mis-rigged or damaged during the accident sequence.

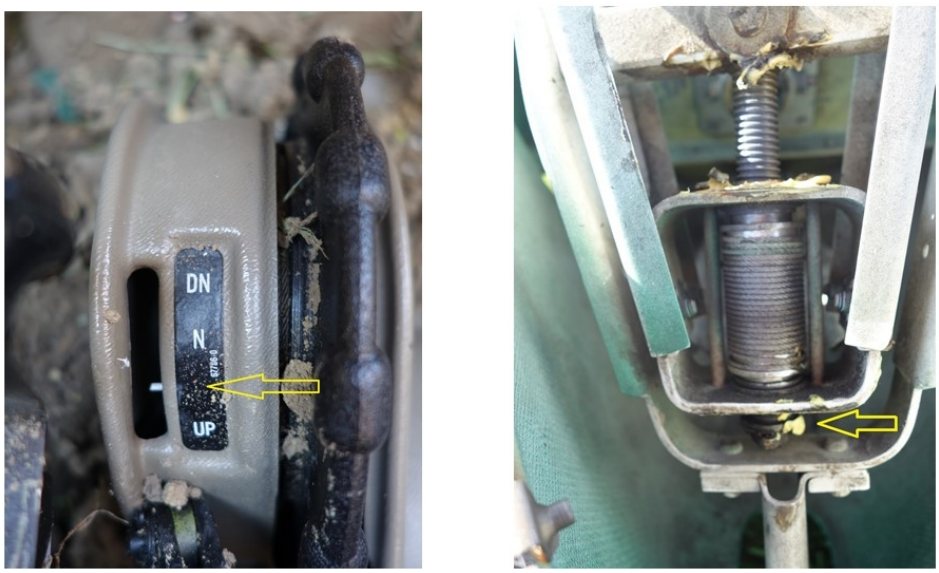

Figure 1: {left} Pilot's pitch trim indication and {right} pitch trim actuator Photos - Piper Aircraft Company

A visual survey of the right engine did not reveal any pre-impact abnormalities; however, the crankshaft flange was fracture separated. The vacuum pump was removed, and adapter was placed in the vacuum pump drive pad to facilitate rotation of the crankshaft. Compression and suction were obtained for all cylinders at the top spark plug openings while the crankshaft was rotated. Internal engine continuity was confirmed through the valve train and to the accessory section. The two magnetos were manually rotated, and a spark was observed from each ignition lead. The engine driven fuel pump was intact, and the drive shaft rotated normally when operated by hand. The turbocharger rotated freely. The top set of spark plugs were removed and exhibited dark colored combustion deposits and "normal – worn" electrodes when compared to the Champion Check a Plug guide.

The right engine's 3-bladed propeller had separated from the engine and was found in the wreckage path but remained attached to the crankshaft propeller flange. All three propeller blades remained captured in the hub. Two of the blades exhibited bending and twisting.

A visual survey of the left engine did not reveal any pre-impact abnormalities, and the propeller remained attached. The vacuum pump was removed, and adapter was placed in the vacuum pump drive pad to facilitate rotation of the crankshaft. Compression/suction was observed on all cylinders at the top

spark plug openings. Internal engine continuity was confirmed through the valve train and to the accessory section. Ignition spark was observed on each lead, on both magnetos. The engine driven fuel pump was intact, and the drive shaft rotated normally when operated by hand. The turbocharger did not rotate freely when turned by hand, the resistance was attributed to impact. The top set of spark plugs were removed and exhibited black colored combustion deposits and "normal – worn" electrodes when compared to the Champion Check a Plug guide.

The left engine's 3-bladed propeller remained attached to the engine. One of the propeller blades was fractured and separated chordwise about 6 inches from the hub. The outer section of the fractured blade was located in the debris field. The second blade was bent aft and rotated beyond normal limits in the hub. The third blade exhibited aft bending.

The airplane was equipped with a Digital Display Monitor Panel (DDMP) which was removed and sent to the NTSB Vehicle Recorder Laboratory in Washington, DC, for download. The unit did not contain non-violate memory (NVM) pertinent to the accident flight.

A Federal Aviation Administration inspector examined the pilot's seat position. He reported that the seat appeared to be locked in the 3rd (forward) position and captured there by deformation of the cabin fuselage.

The NTSB IIC and technical representative from the engine manufacturer conducted the test. The left engine was functionally tested in a test cell. In order to run the engine, several damaged items had to be replaced or repaired, including: engine mounts, oil cooler, No. 6 valve cover, No. 6 ignition lead was repaired, and the left magneto was retimed from 50° before top dead center (BTDC) to match the right magneto at 26° BTDC. A test propeller, exhaust system, and waste gate controller were also installed for the engine run. The engine was started. The engine did not produce full rated horsepower and on occasions produced black exhaust. An exemplar fuel servo was installed on the engine and adjusted; the engine was able to produce rated horsepower. The engine's original fuel servo was examined, and it was found that the fuel servo's control linkage (rod and link assembly) was installed incorrectly.

Figure 1: {left} fuel servo on accident airplane and {right} exemplar servo. Yellow arrows point in the direction that the shaft would rotate.

Administrative Information

Investigator In Charge (IIC):	Hatch, Craig
Additional Participating Persons:	David Shaul; Federal Aviation Administration; Indianapolis, IN Jon Hirsch; Piper Aircraft; Vero Beach, FL Chris Lang; Continental Aerospace Technologies; Mobile, AL
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=99370

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