



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	Sanford, Florida	Accident Number:	ERA17FA148
Date & Time:	April 8, 2017, 12:56 Local	Registration:	N3280M
Aircraft:	Piper PA 12	Aircraft Damage:	Destroyed
Defining Event:	Flight control sys malf/fail	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The accident flight was the airplane's first flight after undergoing restoration over the course of 2 years. Although the mechanic who had worked on the airplane with the pilot wanted the pilot to do a high-speed taxi test before flight, the pilot wanted to "hurry up" and test fly the airplane as he had a friend visiting and wanted to take him flying in the airplane.

During the takeoff, witnesses observed the airplane pitch up into a nose-high attitude just after liftoff, stall, and descend in a nose-down attitude to ground impact. Examination of the wreckage revealed crush damage to the nose and the leading edges of the wings that was consistent with a nearly vertical nose-down flight path at the time of impact. Further examination of the wreckage revealed that the airplane's elevator control cables were misrigged, such that they were attached to the incorrect (opposite) locations on the upper and lower ends of the elevator control horn, resulting in a reversal of elevator control inputs. If the pilot had checked the elevator for correct motion during the preflight inspection and before takeoff check, he likely would have discovered that it was misrigged, and the accident would have been avoided.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The incorrect rigging of the elevator control cables, which resulted in a reversal of elevator control inputs applied by the pilot during the takeoff, an excessive nose-high pitch, and subsequent aerodynamic stall after takeoff. Also causal was the inadequate postmaintenance inspection and the pilot's inadequate preflight inspection and before takeoff check, which failed to detect the misrigging.

Findings

Aircraft	Elevator control system - Incorrect service/maintenance
Personnel issues	Installation - Other
Personnel issues	Post maintenance inspection - Pilot
Personnel issues	Preflight inspection - Pilot
Personnel issues	Use of checklist - Pilot

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Prior to flight	Preflight or dispatch event
Takeoff	Flight control sys malf/fail (Defining event)
Takeoff	Aerodynamic stall/spin
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On April 8, 2017, about 1256 eastern daylight time, a Piper PA-12, N3280M, was destroyed by impact and postcrash fire after takeoff from Orlando Sanford International Airport (SFB), Orlando, Florida. The airline transport pilot was fatally injured. The airplane was registered to and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the local personal flight.

According to air traffic control audio information, the pilot received a takeoff clearance for runway 27L for closed traffic, which the pilot acknowledged. There were no further communications with the pilot.

Multiple witnesses stated that the airplane accelerated normally, lifted off, and immediately pitched up to a near vertical attitude. One witness stated, "it was like someone took the control yoke full aft." The witnesses reported that the airplane reached an altitude of about 100 ft, stalled, rolled to the right, and descended in a nose-down attitude to impact on the right side of runway 27L. A postimpact fire ensued that was extinguished by aircraft rescue and firefighting personnel on the airport. A witness recorded the flight on his mobile telephone. The video showed the airplane's takeoff roll, rotation, and initial climb and ended as the airplane pitched up to a nose-high attitude.

A mechanic who worked on the airplane with the pilot reported that the accident flight was the first flight following a 2-year restoration that included replacement of the wing and fuselage fabric, flight control cables, and electrical wiring. The mechanic stated that he was hesitant for the pilot to fly the airplane on the day of the accident. He wanted the pilot to do a high-speed taxi test first to check the tension on the cables and trim. The pilot stated he wanted to "hurry up and test fly it" as he had a friend visiting and wanted to take him flying in the airplane.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor; Private	Age:	55,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Front
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	Toxicology Performed:	Yes
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	February 7, 2017
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	25000 hours (Total, all aircraft), 150 hours (Total, this make and model)		

The pilot held an airline transport pilot certificate with airplane single- and multi-engine land ratings. He also held a flight instructor certificate with ratings for airplane single-engine, airplane multi-engine, and instrument airplane. His most recent Federal Aviation Administration (FAA) first-class airman medical certificate was issued on February 7, 2017, with the limitation, "must wear corrective lenses. " On the application form for this medical certificate, the pilot reported 25,000 total hours of flight experience and 400 hours in the previous 6 months. According to the pilot's logbooks, he had about 150 total flight hours in the accident airplane.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N3280M
Model/Series:	PA 12 NO SERIES	Aircraft Category:	Airplane
Year of Manufacture:	1947	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	12-2136
Landing Gear Type:	Tailwheel	Seats:	3
Date/Type of Last Inspection:	March 25, 2017 100 hour	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	1735.57 Hrs as of last inspection	Engine Manufacturer:	LYCOMING
ELT:	Installed, not activated	Engine Model/Series:	O-235 SERIES
Registered Owner:	On file	Rated Power:	115 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

The three-seat, high-wing, tail-wheel-equipped, fabric-covered airplane, serial number 12-2136, was manufactured in 1947. It was powered by a 115-horsepower Lycoming O-235-C1C engine, and equipped with a two-bladed, fixed pitch Sensenich propeller. Its most recent annual inspection was completed on March 25, 2017, at which time the airplane had 1,735.57 total flight hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	SFB, 55 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	12:53 Local	Direction from Accident Site:	292°
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:	30.11 inches Hg	Temperature/Dew Point:	22°C / -3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sanford, FL (SFB)	Type of Flight Plan Filed:	None
Destination:	Sanford, FL (SFB)	Type of Clearance:	None
Departure Time:	12:55 Local	Type of Airspace:	Class C

At 1253, the recorded weather at SFB included wind calm, visibility 10 statute miles, sky clear, temperature 22°C, dew point -3°C, and altimeter 30.11 inches of mercury.

Airport Information

Airport:	ORLANDO SANFORD INTL SFB	Runway Surface Type:	Asphalt
Airport Elevation:	54 ft msl	Runway Surface Condition:	Dry
Runway Used:	27L	IFR Approach:	None
Runway Length/Width:	6647 ft / 75 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:		Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	28.77,-81.218887

The airplane came to rest inverted on a heading of about 170° magnetic in a grass area about 9 ft north of the north side of runway 27L, adjacent to the 1,000-ft markers. The nose of the airplane was crushed aft. The propeller remained attached to the engine, and it was located adjacent to a linear ground crater consistent with the dimensions of the propeller.

The empennage, fuselage, cockpit, and wings were consumed by postimpact fire. The engine exhibited significant thermal damage, and several of its accessories had separated during the impact sequence. The engine crankshaft was manually rotated, and continuity of the valve train was established from the crankshaft flange to the rear accessory section. Thumb compression was obtained on all four cylinders.

All flight control surfaces (ailerons, flaps, rudder, elevators, and trimmable horizontal stabilizer) remained attached to their respective attach points. The left and right aileron cables were continuous from the control stick to their respective bellcranks. The rudder cables were continuous from the foot pedals to the rudder bellcrank.

The elevator control cables were continuous from the upper and lower attach points on the elevator control horn to the forward and rear control sticks. Manipulation of the elevator control cables revealed that a nose-up input on either control stick resulted in a nose-down deflection of the elevator (instead of the proper nose-up deflection) and vice versa. Further examination revealed that the elevator cables were attached to the incorrect (opposite) attach points on the elevator control horn, which resulted in the reversal of elevator control inputs.

Medical and Pathological Information

The Office of the Medical Examiner, Leesburg, Florida, performed an autopsy of the pilot. The cause of death was listed as thermal and blunt force injuries.

The FAA Bioaeronautical Science Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing. The results were negative for alcohol and drugs.

Additional Information

During preflight inspection of a PA-12 (before engine start), a pilot can see the elevator's corresponding movements when the control stick is manipulated (either when standing by the open cockpit door or when seated in the front seat); likewise, a pilot standing on the ground and manipulating the elevator by hand can look forward and see the corresponding control stick movement. During a before takeoff check of the PA-12, a pilot can view the elevator from the pilot seat by turning around and looking back.

The National Transportation Safety Board (NTSB) issued Safety Alerts SA-041, "Pilots: Perform Advanced Preflight after Maintenance," and SA-042, "Mechanics: Prevent Misrigging Mistakes," in March 2015. That same month, the NTSB also released a Video Safety Alert, "Airplane Misrigging: Lessons Learned from a Close Call." The NTSB Safety Alerts and video, which inform general aviation pilots and mechanics about the circumstances of these types of accidents and provide information to help prevent such accidents, can be accessed from the NTSB's web site at www.nts.gov.

Preventing Similar Accidents

Prevent Misrigging Mistakes (SA-042)

The Problem

Incorrect rigging of flight control and trim systems has led to in-flight emergencies, accidents, and even deaths. Maintenance personnel who serviced or checked the systems did not recognize that the control or trim surfaces were moving in the wrong direction. Pilots who flew the airplanes did not notice the control anomalies during their preflight checks. Anyone can make mistakes. In some cases, the mechanics who performed the work incorrectly were highly experienced.

What can you do?

- Become familiar with the normal directional movement of the controls and surfaces before disassembling the systems. It is easier to recognize "abnormal" if you are very familiar with what "normal" looks like.
- Carefully follow manufacturers' instructions to ensure that the work is completed as specified. Always refer to up-to-date instructions and manuals—including airworthiness directives, maintenance alerts, special airworthiness information bulletins, and unapproved parts notifications—when performing a task.
- Be aware that some maintenance information, especially for older airplanes, may be nonspecific. Ask questions of another qualified person if something is unfamiliar.

- Remember that well-meaning, motivated, experienced technicians can make mistakes: fatigue, distraction, stress, complacency, and pressure to get the job done are some common factors that can lead to human errors. Learn about and adhere to sound risk management practices to help prevent common errors.
- Ensure that the aircraft owner or pilot is thoroughly briefed about the work that has been performed. This may prompt them to thoroughly check the system during preflight or help them successfully troubleshoot if an in-flight problem occurs.

See <https://www.nts.gov/Advocacy/safety-alerts/Documents/SA-042.pdf> for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Hill, Millicent
Additional Participating Persons:	Ric Riccardi; FAA/FSDO; Orlando, FL Mike Childers; Lycoming; Williamsport, PA
Original Publish Date:	May 9, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=94974

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).