



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Middlebury, VT	<b>Accident Number:</b>	ERA17FA072
<b>Date &amp; Time:</b>	12/23/2016, 1145 EST	<b>Registration:</b>	N31202
<b>Aircraft:</b>	PIPER PA28	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (partial)	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Personal		

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## Analysis

The airplane had not been flown recently, and, before the personal flight, the private pilot cleared snow from the airplane's wings, charged the airplane's battery, and preheated the engine. He then performed a preflight inspection and drained the fuel tanks. The pilot taxied the airplane to the runway and departed. A witness reported that, during the initial climb, the airplane's wings "wagged," then the engine "skipped" and then "went back to normal." Another witness reported that he heard the engine "sputtering" and saw the airplane make a 180° turn back toward the runway. Both witnesses stated that the airplane then quickly descended. The observations of the witnesses are consistent with the pilot losing control of the airplane while attempting to return to the runway following a partial or complete loss of engine power.

Examination of the airframe and engine revealed no anomalies that would have precluded normal operation with the exception of the right fuel cap, which remained seated but its gasket exhibited cracking. Although there was no contamination noted in the fuel system during the engine examination, it is possible that water had leaked through the cracked fuel cap gasket and was not completely drained during the pilot's preflight inspection. Then, following the wings being "wagged," the remaining water entered the fuel system and resulted in a partial or total loss of engine power. In response to the power loss, the pilot attempted to return to the runway; however, during the turn, the pilot failed to maintain sufficient airspeed, which resulted in the airplane exceeding its critical angle of attack and entering an aerodynamic stall. The pilot's decision to return to the runway was contrary to FAA guidance that recommended continuing straight ahead following an engine failure on takeoff.

The pilot did not hold a medical certificate and had a history of seizures. However, it is unlikely that the pilot had a seizure at the time of the accident as he was taking the medication levetiracetam to prevent seizures, and a seizure would have led to sudden incapacitation, which is inconsistent with the witness observations that indicate an intentional return to the airport. The pilot had been maintained on levetiracetam since 2010 without a complaint about somnolence; therefore, it is unlikely his use of this medication contributed to the accident. Tramadol was identified only in the pilot's urine, which indicated it was used many hours to

days before the accident and was no longer present at impairing levels at the time of the accident. Overall, there was no evidence of a medical condition or medication that contributed to the circumstances of this accident.

## Probable Cause and Findings

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

The pilot's improper decision to return to the airport following a partial or complete loss of engine power during takeoff initial climb and his failure to maintain sufficient airspeed while maneuvering, which resulted in exceedance of the critical angle of attack and an aerodynamic stall.

### Findings

#### Aircraft

Airspeed - Not attained/maintained (Cause)  
Angle of attack - Not attained/maintained (Cause)

#### Personnel issues

Decision making/judgment - Pilot (Cause)  
Aircraft control - Pilot (Cause)

## Factual Information

### History of Flight

Initial climb	Loss of engine power (partial) (Defining event)
Maneuvering	Loss of control in flight
	Collision with terr/obj (non-CFIT)

On December 23, 2016, about 1145 eastern standard time, a Piper PA-28-161 airplane, N31202, was substantially damaged when it impacted trees and terrain while maneuvering after takeoff from Middlebury State Airport (6B0), Middlebury, Vermont. The private pilot was fatally injured. The airplane was registered to PC Air Ventures Ltd 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 that was originating when the accident occurred.

According to a witness at the airport, the airplane was based at 6B0 and had not been flown during the past 2 months. The witness reported that the pilot arrived at the airport about 0815, cleared snow from the airplane's wings, put a battery charger on the battery, and plugged in the engine heater. The pilot then performed a preflight inspection and drained fuel samples from the fuel tanks. About 1135, the pilot taxied the airplane to runway 19 and departed. During the initial climb, about 150 ft above ground level, the airplane's wings "wagged." The airplane climbed about another 150 ft, and the engine "skipped" and then "went back to normal." The airplane continued to climb, made a slight right turn, and then entered a left turn. When the bank angle was about 45°, the airplane "stalled" and "rapidly" descended until it struck trees.

Another witness, who was at a business about 500 ft south of the departure end of runway 19, heard an engine "sputtering" and looked up and saw the airplane flying south. The airplane "then looped in a counter-clockwise direction" and headed north. The witness could not hear any engine noise from the airplane as it descended "at a fast rate" and collided with a tree. When the witness ran to the accident site, he smelled fuel and saw that a fire had erupted. The witness cut the pilot's seatbelt and pulled him from the airplane.

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	42, Male
<b>Airplane Rating(s):</b>	Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Lap Only
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 None	<b>Last FAA Medical Exam:</b>	08/06/2009
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	750 hours (Total, all aircraft)		

According to Federal Aviation Administration (FAA) records, the pilot held a private pilot certificate with an airplane single-engine land rating. The pilot was issued a third-class medical certificate on August 6, 2009, with no limitations; this medical certificate expired on August 31, 2014. At that time, he reported 750 hours of total flight experience of which 54 hours were within the previous 6 months. In addition, the pilot held an airframe and powerplant mechanic certificate as well as an inspection authorization.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	PIPER	<b>Registration:</b>	N31202
<b>Model/Series:</b>	PA28 161	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1978	<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal; Utility	<b>Serial Number:</b>	28-7816552
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	06/14/2016, Annual	<b>Certified Max Gross Wt.:</b>	1502 lbs
<b>Time Since Last Inspection:</b>	10 Hours	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	8582 Hours as of last inspection	<b>Engine Manufacturer:</b>	LYCOMING
<b>ELT:</b>	Installed	<b>Engine Model/Series:</b>	O-320 SERIES
<b>Registered Owner:</b>	PC AIR VENTURES LTD	<b>Rated Power:</b>	160 hp
<b>Operator:</b>	PC AIR VENTURES LTD	<b>Operating Certificate(s) Held:</b>	None

According to FAA records, the airplane was issued an airworthiness certificate on April 10, 1978. The 4-place airplane was equipped with a Sensenich fixed-pitch propeller and a 160-horsepower Lycoming O-320 engine. According to the airplane's maintenance logs, an annual

inspection was performed on the airplane on June 14, 2016, at a total time of 8,582.0 hours. According to a witness, the airplane had been flown about 10 hours since the annual inspection was performed in June 2016.

The most recent fueling of the airplane at 6Bo was 15 gallons of 100LL aviation fuel on May 26, 2016.

According to the Pilot Operating Handbook (POH), the airplane was equipped with two 25-gallon fuel tanks. A drain was located at the bottom, inboard, rear corner of each fuel tank, and a fuel strainer with a drain was located on the lower left front of the firewall.

According to the "Handling, Servicing, and Maintenance" section of the POH, the fuel tank drains and the strainer should be drained daily before the first flight and after refueling to avoid the accumulation of contaminants such as water or sediment. The fuel strainer should be drained twice, once with the fuel selector valve on each tank. Each time fuel was drained, sufficient fuel should be allowed to flow to ensure removal of contaminants.

### Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual Conditions	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	6B0, 490 ft msl	<b>Distance from Accident Site:</b>	0 Nautical Miles
<b>Observation Time:</b>	1135 EST	<b>Direction from Accident Site:</b>	
<b>Lowest Cloud Condition:</b>	Scattered / 3200 ft agl	<b>Visibility</b>	10 Miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	11 knots / 14 knots	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	180°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.26 inches Hg	<b>Temperature/Dew Point:</b>	3°C / -3°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Middlebury, VT (6B0)	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Middlebury, VT (6B0)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	1145 EST	<b>Type of Airspace:</b>	

The 1135 recorded weather observation at 6Bo included wind from 180° at 11 knots gusting to 14 knots, visibility 10 miles, scattered clouds at 3,200 ft above ground level, temperature 3°C, dew point -3°C, and altimeter setting 30.26 inches of mercury.

## Airport Information

<b>Airport:</b>	MIDDLEBURY STATE (6B0)	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	490 ft	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	19	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	2500 ft / 50 ft	<b>VFR Approach/Landing:</b>	Unknown

6B0 was a public use airport located 3 miles southeast of Middlebury and did not have an operating control tower. It had one runway, runway 1/19, which was 2,500 ft long by 50 ft wide. The airport elevation was 490 ft above mean sea level.

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	On-Ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	43.981389, -73.094444 (est)

The airplane came to rest in an upright position about 300 ft from the departure end of runway 19. Pieces of tree branches that exhibited 45°-angle cuts and dark paint transfer were located along the debris path. The main wreckage was oriented on a 347° magnetic heading, the debris path was oriented on a 360° magnetic heading, and measured about 160 ft in length. All major components of the airplane were accounted for at the scene. The fuselage remained intact but was heavily damaged by impact forces and a postimpact fire. Flight control continuity was confirmed from all flight control surfaces to the cockpit through multiple control cable fractures that were consistent with overload. The fuel tanks were breeched; the left fuel tank exhibited thermal damage, and the right fuel tank exhibited heavy impact damage. The right fuel cap remained seated but the gasket exhibited cracking, and the left fuel cap remained seated but was thermally damaged.

The engine remained attached to the airframe through all but one engine mount and was removed to facilitate further examination. Engine crankshaft continuity was confirmed from the propeller flange to the rear accessory section of the engine. All cylinders remained attached to the crankcase. The rocker box covers were removed, and no anomalies were noted with the valve springs and rocker arms. Valve train continuity was confirmed when the crankshaft was rotated. The cylinders were examined with a borescope, and no anomalies were noted with the cylinders, pistons, and valves. Piston movement and thumb compression was observed on all cylinders. Both magnetos remained attached to the engine. The magnetos were removed, and sparks were observed on all towers when they were rotated by hand. The top spark plugs were removed, and their electrodes were dark gray in color consistent with the Champion Check-A-

Plug chart.

The engine-driven fuel pump was removed and disassembled. The fuel pump expelled liquid that was consistent in odor with 100LL aviation fuel when the arm was actuated by hand. No debris was noted in the liquid. There were no anomalies noted with the fuel pump. Fuel was noted in the fuel line to the carburetor. The carburetor box was impact damaged. The carburetor was impact separated from the engine but remained attached through cables. The carburetor was disassembled, and no liquid was noted in the fuel bowl. The carburetor floats exhibited damage consistent with hydraulic deformation. Debris that was like the dirt at the accident site was noted in the carburetor. The carburetor inlet fuel screen was removed, and no debris was noted.

The propeller was separated from the engine and located about 20 ft forward of the main wreckage. Both blades exhibited slight S-bending and chordwise scratching.

## Medical And Pathological Information

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The Vermont State Department of Health's Office of the Chief Medical Examiner, Burlington, Vermont, performed the autopsy on the pilot. The autopsy report indicated that the pilot died as a result of multiple blunt impact injuries.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing of the pilot. Fluid specimens from the pilot tested negative for carbon monoxide and ethanol. Levetiracetam was detected in urine and blood, and tramadol was detected in urine but not in blood.

Levetiracetam is an anticonvulsant prescription medication used to treat certain types of seizures in adults and children with epilepsy. This medication is disqualifying for FAA aeromedical certification. Tramadol is an opiate analgesic prescription medication used to relieve moderate to moderately severe pain. This medication has abuse potential and has the potential to impair the mental and/or physical ability required for the performance of potentially hazardous tasks such as driving, flying, and operating heavy machinery.

Medical records obtained from the Department of Veterans Affairs (VA) revealed that the pilot was first diagnosed with epilepsy in 1996. The pilot had been maintained on levetiracetam since 2010 without a complaint about somnolence. Then, in August 2015, he had a series of three seizures on the same day. He was prescribed levetiracetam twice a day to control the seizures and told not to drive a car for 6 months after this event. The pilot reported no further seizures to his VA providers through his last appointment, dated December 14, 2016.

## Additional Information

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## Emergency Procedures - Engine Power Loss During Takeoff Checklist

According to the emergency procedures section of the POH, the following steps should be performed in the event of an engine power loss during takeoff:

If insufficient runway remains:

Maintain safe airspeed  
Make only shallow turn to avoid obstructions  
Flaps as situation requires

### FAA Safety Team – Aircraft Control After Engine Failure on Takeoff

A pamphlet published by the FAA Safety Team titled, "Aircraft Control After Engine Failure on Takeoff," stated, in part: "Studies have shown that startle responses during unexpected situations such as a powerplant failure during takeoff or initial climb have contributed to loss of control of aircraft...Research indicates a higher probability of survival if you continue straight ahead following an engine failure after takeoff. Turning back actually requires a turn of greater than 180 degrees after taking into account the turning radius. Making a turn at low altitudes and airspeeds could create a scenario for a stall/spin accident."

## Preventing Similar Accidents

### Prevent Aerodynamic Stalls at Low Altitude

While maneuvering an airplane at low altitude in visual meteorological conditions, many pilots fail to avoid conditions that lead to an aerodynamic stall, recognize the warning signs of a stall onset, and apply appropriate recovery techniques. Many stall accidents result when a pilot is momentarily distracted from the primary task of flying, such as while maneuvering in the airport traffic pattern, during an emergency, or when fixating on ground objects.

An aerodynamic stall can happen at any airspeed, at any altitude, and with any engine power setting. Pilots need to be honest with themselves about their knowledge of stalls and preparedness to recognize and handle a stall situation. Training can help pilots fully understand the stall phenomenon, including angle-of-attack (AOA) concepts and how weight, center of gravity, turbulence, maneuvering loads, and other factors can affect an airplane's stall characteristics. The stall characteristics may be different in each type of airplane, so learn them before you fly.

The stall airspeeds marked on the airspeed indicator (for example, the bottom of the green arc and the bottom of the white arc) typically represent steady flight speeds at 1G at the airplane's maximum gross weight in the specified configuration. Maneuvering loads and other factors can increase the airspeed at which the airplane will stall. For example, increasing bank angle can increase stall speed exponentially.

Reducing AOA by lowering the airplane's nose at the first indication of a stall is the most important immediate response for stall avoidance and stall recovery. This may seem counterintuitive at low altitudes, but is a necessary first step.

See [http://www.nts.gov/safety/safety-alerts/documents/SA\\_019.pdf](http://www.nts.gov/safety/safety-alerts/documents/SA_019.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

<b>Investigator In Charge (IIC):</b>	Heidi Kemner	<b>Report Date:</b>	07/16/2018
<b>Additional Participating Persons:</b>	Daniel Jockett; FAA/FSDO; Portland, ME Mike Childers; Lycoming Engines; Atlanta, GA		
<b>Publish Date:</b>	07/16/2018		
<b>Note:</b>	The NTSB traveled to the scene of this accident.		
<b>Investigation Docket:</b>	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=94529">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=94529</a>		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).