# Aviation Investigation Final Report

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| **Location:** | Jasper, Georgia | **Accident Number:** | ERA16FA005 |
| **Date & Time:** | October 8, 2015, 18:30 Local | **Registration:** | N4313E |
| **Aircraft:** | Piper PA 38-112 | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Fuel exhaustion | **Injuries:** | 1 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Instructional | | |

## Analysis

The student pilot was on his second supervised solo flight. According to the flight instructor, before the airplane departed, he observed the student pilot's preflight inspection of the airplane, and the student reported to him that the airplane had 14 gallons of fuel onboard. The flight instructor could not recall if he visually checked the fuel quantity himself or if the student used a fuel quantity measuring stick when checking the quantity. Further, the flight school's manager stated that he saw the instructor speaking on his phone while the student was performing the preflight.

After takeoff, the student pilot flew to the practice area and came back to the airport about 1 hour later. The student pilot then performed a touch-and-go landing. During the climb after the touch-and-go, the flight instructor heard the engine suddenly stop running. The instructor saw the airplane turn to the left like the student pilot was going to return to the airport. The airplane entered an aerodynamic stall and then a spin to the left. It descended rapidly while in the spin until the instructor lost sight of the airplane behind trees; he then heard the impact.

Examination of the accident site and wreckage revealed that the airplane impacted the ground about 1,700 ft from the departure end of the runway. Ground scarring and the lack of damage to the propeller indicated that the engine was not producing power during the impact sequence. The examination found no evidence of preimpact mechanical failures that would have precluded normal operation of the airplane. However, the examination revealed that the fuel system was devoid of usable fuel. A broken fuel quantity measuring stick made from a wooden dowel was discovered in the wreckage.

Review of the flight log recovered from the wreckage indicated that the airplane had been operated about 4.9 hours since the last refueling. According to the airplane manufacturer's pilot operating handbook, the airplane's endurance was about 4.5 hours when fueled to its maximum capacity of 32 total gallons, of which 30 gallons were usable. Although the student reported to the instructor that 14 gallons of fuel, or about half of its total capacity, were onboard, given the airplane's fuel consumption rate, it is unlikely that the airplane would have been devoid of fuel after 1 hour of flight had this assertion been

accurate. Therefore, it is likely that the student erred in measuring the fuel onboard during his preflight inspection. Had the flight instructor personally observed the airplane's fuel state prior to the flight, he might have noticed the discrepancy and corrected the problem. Additionally, the flight school had no written policies or procedures regarding fueling. If a policy had been in place that prescribed a minimum fuel level prior to departure, or required the flight instructor to personally verify the fuel quantity on board before a student departed on a solo flight, the accident may have been prevented.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The student pilot's failure to accurately determine the airplane's fuel state, subsequent fuel exhaustion, and a total loss of engine power during initial climb. Contributing to the accident was the flight instructor's inadequate oversight of the student pilot's preflight inspection, the flight school's lack of fueling procedures, and the student pilot's exceedance of the airplane's critical angle-of-attack, which resulted in an aerodynamic stall.

### Findings

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| **Personnel issues** | (general) - Instructor/check pilot |
| **Aircraft** | Fuel - Inadequate inspection |
| **Aircraft** | Fuel - Fluid level |
| **Organizational issues** | Oversight of operation - Training organization |
| **Personnel issues** | Aircraft control - Student/instructed pilot |
| **Aircraft** | Airspeed - Not attained/maintained |
| **Aircraft** | Angle of attack - Not attained/maintained |

# Factual Information

## History of Flight

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| **Prior to flight** | Preflight or dispatch event |
| **Initial climb** | Fuel exhaustion (Defining event) |
| **Initial climb** | Loss of engine power (total) |
| **Emergency descent** | Abrupt maneuver |
| **Emergency descent** | Aerodynamic stall/spin |
| **Uncontrolled descent** | Collision with terr/obj (non-CFIT) |

On October 8, 2015, about 1830 eastern daylight time, a Piper PA-38-112, N4313E, operated by Asterix Aviation LLC, was substantially damaged when it impacted terrain after a loss of engine power in Jasper, Georgia. The student pilot was fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the local solo instructional flight conducted under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91, which departed from Pickens County Airport (JZP), Jasper, Georgia, about 1720.

According to the student pilot's flight instructor, the student pilot was on his second supervised solo flight. The instructor reported that he saw the student pilot perform the preflight inspection of the airplane and that the student pilot "reported to him" that 14 gallons of fuel were in the airplane. The flight instructor could not recall if he backed the student up by visually checking the fuel quantity himself and could not recall if the student used a fuel stick when checking the quantity.

The flight school's general manager, who was leaving the airport at the time, saw the flight instructor on the ramp using his mobile phone while the student was performing the preflight inspection.

The flight instructor reported that, after takeoff from JZP, the student flew to the practice area and returned to the airport about an hour later. The student then performed a touch-and-go landing on runway 16. During climb after the touch-and-go, the flight instructor heard the engine suddenly stop running. The airplane then "sunk down," and he saw the airplane turn to the left like the student pilot was going to return to the airport. The airplane then appeared to enter an aerodynamic stall and then spin to the left. It descended rapidly while still in the spin until it was lost from view behind trees, and the flight instructor heard the sound of impact.

## Student pilot Information

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| **Certificate:** | Student | **Age:** | 21,Male |
| **Airplane Rating(s):** | None | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | 3-point |
| **Instrument Rating(s):** | None | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 3 Without waivers/limitations | **Last FAA Medical Exam:** | August 14, 2015 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 13.5 hours (Total, all aircraft), 12.5 hours (Total, this make and model), 2.7 hours (Pilot In Command, all aircraft), 13.5 hours (Last 90 days, all aircraft), 5.3 hours (Last 30 days, all aircraft), 1.3 hours (Last 24 hours, all aircraft) | | |

Student Pilot

According to Federal Aviation Administration (FAA) airman records and pilot records, the student pilot, age 21, held a third-class medical with a student pilot certificate issued on August 24, 2015.

Review of pilot records indicated that he had taken his pre-solo written exam on September 11, 2015. Before the accident flight, he had accumulated 13.5 total hours of flight experience, 1.3 hours of which were in solo flight. His previous supervised solo flight had occurred on September 21, 2015 (17 days before the accident flight). No dual instruction was logged after that date.

Flight Instructor

The flight instructor, age 31, held a commercial pilot certificate with ratings for airplane single-engine land, airplane multi-engine land, and instrument airplane. He also possessed a flight instructor certificate with ratings for airplane single-engine and instrument airplane. He reported that, during the previous year, he had soloed 10 students, and, at the time of the accident, he had accumulated about 3,400 hours of flight experience, 2,900 of which were as flight instructor.

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Piper | **Registration:** | N4313E |
| **Model/Series:** | PA 38-112 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | 1978 | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 38-78A0546 |
| **Landing Gear Type:** | Tricycle | **Seats:** | 2 |
| **Date/Type of Last Inspection:** | October 3, 2015 Annual | **Certified Max Gross Wt.:** | 1670 lbs |
| **Time Since Last Inspection:** | 7 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 3147.3 Hrs as of last inspection | **Engine Manufacturer:** | Lycoming |
| **ELT:** | C91 installed, activated, did not aid in locating accident | **Engine Model/Series:** | O-235-L2C |
| **Registered Owner:** | BRIAN K GODFREY ENTERPRISES INC | **Rated Power:** | 112 Horsepower |
| **Operator:** | Asterix Aviation LLC | **Operating Certificate(s) Held:** | None |

The airplane was a 2-seat, single engine, low-wing, fixed-gear monoplane of conventional metal construction. It was equipped with a 4-cylinder, air-cooled, horizontally opposed, normally aspirated, 112-horsepower Lycoming O-235-L2C engine, driving a metal, two-blade Sensenich 72CK-0-56, fixed pitch propeller.

According to FAA airworthiness records and airplane maintenance records, the airplane was manufactured in 1978. The airplane's most recent annual inspection was completed on October 3, 2015. At the time of the inspection, the airplane had accrued about 3,147 total hours of operation.
Review of the airplane's fuel system indicated that fuel was stored in two 16-gallon (15 gallons usable) fuel tanks, giving the airplane a total capacity of 32 gallons (30 gallons usable). The fuel tank selector control was in the center of the engine control quadrant; the selector had three positions: right, left, and off. A fuel quantity gauge for the left fuel tank was located adjacent to the left side of the fuel selector, and a fuel quantity gauge for the right fuel tank was located adjacent to the right side of the fuel selector.

According to the Piper PA-38-112 Pilot's Operating Handbook (POH), during the preflight inspection, the fuel quantity gauges were to be checked, the fuel tank sumps and fuel strainer were to be drained, and the fuel quantity and color were to be visually checked by opening the fuel tank caps and looking inside each of the fuel tanks.
Review of the POH also indicated that:

- At a power setting of 75%, the engine would consume fuel at a rate of 6.5 gallons per hour (gph).
- At a power setting of 65%, the engine would consume fuel at a rate of 5.75 gph.
- At a power setting of 55%, the engine would consume fuel at a rate of 5.0 gph.

Further review of the POH indicated that, at a 65% power setting, endurance would be about 4.5 hours.

Examination of fuel receipts revealed that the airplane had last been refueled on October 5, 2015. Examination of the "Time Sheet" (aircraft flight log) that was recovered from the wreckage indicated that the airplane's recording hour meter read 1,533.0 at the time of the last refueling. The sheet further indicated that the airplane had been flown on four other flights before the accident flight and that, when the accident occurred at an hour meter reading of 1,537.9, the airplane had been operated about 4.9 hours since the last refueling.

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | JZP,1535 ft msl | **Distance from Accident Site:** | 1 Nautical Miles |
| **Observation Time:** | 18:35 Local | **Direction from Accident Site:** | 336° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | / | **Turbulence Type Forecast/Actual:** | / None |
| **Wind Direction:** | | **Turbulence Severity Forecast/Actual:** | / N/A |
| **Altimeter Setting:** | 30.14 inches Hg | **Temperature/Dew Point:** | 24°C / 12°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Jasper, GA (JZP ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Jasper, GA (JZP ) | **Type of Clearance:** | None |
| **Departure Time:** | 17:06 Local | **Type of Airspace:** | Class G |

The recorded weather at JZP, at 1835, about 5 minutes after the accident, included: calm winds, 10 miles visibility, clear skies, temperature 24°C, dew point 12°C, and an altimeter setting of 30.15 inches of mercury.

## Airport Information

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| **Airport:** | Pickens County Airport JZP | **Runway Surface Type:** | Asphalt |
| **Airport Elevation:** | 1535 ft msl | **Runway Surface Condition:** | Dry |
| **Runway Used:** | 16 | **IFR Approach:** | None |
| **Runway Length/Width:** | 5000 ft / 100 ft | **VFR Approach/Landing:** | Forced landing;Touch and go |

JZP was a publicly owned airport, located 2 miles southwest of the central business district of Jasper, Georgia. The field elevation was 1,535 ft, and the airport had one runway oriented in a 16/34 configuration. Runway 16 was asphalt, in good condition, and had a left traffic pattern. The runway was 5,000 ft long and 100 ft wide. It was marked with nonprecision markings in good condition, and the runway gradient was 0.7% uphill. It was equipped with medium

intensity runway lights and a 2-light precision approach path indicator, which provided a 3.00° glide path to touchdown.

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Fatal | **Latitude, Longitude:** | 34.443054,-84.451667 |

The airplane came to rest in a small, grass-covered, automobile parking area located about 1,687 ft from the departure end of runway 16. All major components of the airplane were identified on site. The initial impact point was located 36 ft on a 252° magnetic heading from where the airplane had come to rest. There was no discernable wreckage path, and numerous components were spread throughout the area of the accident site.

Examination of the wreckage revealed that the aft fuselage was almost completely separated from the cabin. The engine was separated from the firewall; the propeller was separated from the engine; and the wings remained attached to their fittings.

Examination of the flight control system revealed no evidence of any preimpact failures or malfunctions, and control continuity was established from the rudder, elevator, and ailerons to the cockpit controls. The wing flaps were in the 34° (fully extended) position.

Examination of the cabin revealed that the master switch was in the "ON" position, and the magneto switch was in the "BOTH" position. The throttle was full forward; the mixture was full rich; and the primer was in and locked. The electric fuel pump was in the "OFF" position. The recording hour meter indicated 1,537.9 operating hours. A broken fuel stick made from a wooden dowel was found in the cabin. The dowel had the airplane registration number hand-written on it in ink, as well as a hand-drawn graduated scale. It also contained the hand-written words: "BOTTOM OF TANK IS 4 GAL."

Examination of the propeller revealed that damage to the nose spinner was concentrated on one side where it displayed crush and compression damage. Both propeller blades displayed minimal aft bending, minimal rotational scoring, and no evidence of leading edge gouging.

Examination of the engine revealed that oil was present in the rocker boxes and the galleries of the engine. Drivetrain continuity was established, and the intake valves and exhaust valves on all four cylinders were functional. Thumb compression was present on all four cylinders, and internal examination using a borescope revealed no anomalies. The spark plugs electrodes appeared normal and were light grey in color. Both magnetos were functional and produced spark from all towers.

Examination of the fuel system revealed that the engine-driven fuel pump was functional, but internal examination revealed that it was devoid of fuel. The carburetor was impact damaged; the float bowl had separated from the carburetor body; and the floats had been ejected from the float bowl. No evidence of fuel staining in the float bowl was present. The fuel strainer bowl was devoid of fuel. The fuel selector valve was in the right fuel tank position.

When the fuel tank caps were opened with the airplane in the position it came to rest (the left wing parallel to the ground and the right wingtip about 6 ft above the ground with the right wing at an angle of about 29° to the ground), a small amount of fuel about 1/4-inch-deep was observed in the bottom of the left tank. No fuel could be observed in the right tank. After suspending the attached cabin section from a crane in a wings level position, the fuel system was drained, which revealed that a negligible amount of fuel was present in the left fuel tank, and about 1/2 cup of fuel was present in the right tank.

## Medical and Pathological Information

The Georgia Bureau of Investigation, Division of Forensic Sciences, performed an autopsy on the student pilot. The student's cause of death was blunt trauma of the head and neck.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing of the student pilot. The specimens from the student pilot were negative for carbon monoxide, basic, acidic, and neutral drugs.

## Tests and Research

Examination of the fuel provider's records did not reveal any evidence of contamination. The certificate of analysis indicated that the fuel met the standard specification for aviation gasoline (ASTM D910), and the fuel facility checks indicated that all the fuel samples were clear and bright. The fueling facility had provided fuel to 13 other aircraft after the accident airplane had been fueled, dispensing a total of 330.78 gallons without any fuel-related problems being reported.

## Organizational and Management Information

Asterix Aviation LLC, was organized on January 7, 2014 by Phobio LLC, a personal electronic device trade-in company located in Kennesaw, Georgia. Asterix Aviation operated out of two airports, JZP and Cobb County International Airport, Kennesaw, Georgia. At the time of the

accident, they employed four flight instructors (this included the general manager who also instructed) and had about 44 students. The flight school had no written policies or procedures regarding fueling.

## Additional Information

Aviation Instructor's Handbook (FAA-H-8083-9A)

According to Chapter 7, "Instructor Responsibilities and Professionalism," under the section titled "Aviation Instructor Responsibilities," lists five main responsibilities of aviation instructors. Those responsibilities are: "Helping Students learn. Providing adequate instruction. Demanding adequate standards of performance. Emphasizing the positive. Ensuring aviation safety." The chapter further explains that there are at least eight "Additional Responsibilities of Flight Instructors." One of those additional responsibilities is "Pilot supervision."

## Administrative Information

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| **Investigator In Charge (IIC):** | Gunther, Todd |
| **Additional Participating Persons:** | Vincent L English; FAA/FSDO; Atlanta, GA<br>Judson Rupert; Lycoming Engines; Williamsport, PA |
| **Original Publish Date:** | November 13, 2017 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | The NTSB traveled to the scene of this accident. |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=92146 |