



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Kuttawa, KY	<b>Accident Number:</b>	ERA15FA088
<b>Date &amp; Time:</b>	01/02/2015, 1755 CST	<b>Registration:</b>	N81291
<b>Aircraft:</b>	PIPER PA34	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Fuel starvation	<b>Injuries:</b>	4 Fatal, 1 Serious
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Personal		

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## Analysis

The commercial pilot departed on a cross-country flight in night instrument meteorological conditions with the airplane's fuel tanks full, providing an estimated fuel endurance of 4 hours 50 minutes. Two hours 50 minutes into the flight, the pilot reported a loss of engine power on the right engine, which was followed by a loss of engine power on the left engine. The pilot attempted to land at a nearby airport; however, the airplane impacted trees about 8 miles short of the airport. A review of weather information revealed no evidence of in-flight icing or other weather conditions that may have contributed to the accident.

Postaccident examination of the airframe and engines revealed no preimpact failures or malfunctions that would have precluded normal operation. All fuel tanks were compromised; however, an undetermined amount of fuel spilled from the left fuel tank during recovery of the wreckage. The left engine fuel selector valve was found in the "X-FEED" (crossfeed) position, and the corresponding cockpit fuel selector switch was found in an intermediate position, which was likely the result of impact damage. The right engine fuel selector valve and the corresponding cockpit fuel selector switch were found in the "ON" position. With the valves in these positions, both the left and right engines would have consumed fuel from the right fuel tank. Review of performance charts and fueling records indicated that if the flight was conducted with the valves in the as-found positions, exhaustion of the fuel in the airplane's right fuel tank would have occurred about the time the pilot reported the dual engine failure. In addition, the yaw trim was found in the full nose-right position. It is possible that the pilot used nose-right yaw trim to counteract an increasing left-turning tendency during the flight as fuel was burned from only the right wing's fuel tank making it relatively lighter than the left wing.

According to the expanded checklist in the pilot's operating handbook for the airplane, during taxi, the pilot was to move each fuel selector to "X-FEED" for a short time, while the other selector was in the "ON" position, before returning both fuel selectors to the "ON" position before takeoff. According to a checklist found in the airplane, the fuel selectors were to be set to "X-FEED" during taxi and then to "ON" during engine run up. GPS data recovered from onboard devices indicated that the pilot taxied from the ramp and onto the active runway

without stopping in about 3 minutes, indicating that it is unlikely he performed a complete run up of both engines before takeoff. He likely failed to return the left engine fuel selector from the "X-FEED" to the "ON" position, where it remained throughout the flight and resulted in fuel starvation and a loss of engine power on both engines.

Toxicological testing revealed that the pilot was taking citalopram (an antidepressant) and rosuvastatin (a statin); however, it is unlikely these drugs contributed to the accident. Review of medical and pathological information revealed no evidence of any medical condition that may have contributed to the accident.

## Probable Cause and Findings

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

The pilot's failure to properly set the left engine fuel selector before takeoff and to recognize the incorrect setting during the flight, which resulted in fuel starvation and a loss of engine power on both engines.

### Findings

<b>Aircraft</b>	Fuel selector/shutoff valve - Incorrect use/operation (Cause) Fuel - Fluid management (Cause)
<b>Personnel issues</b>	Use of checklist - Pilot (Cause)

## Factual Information

### History of Flight

Prior to flight	Miscellaneous/other
Enroute-cruise	Fuel starvation (Defining event)
Emergency descent	Off-field or emergency landing Collision with terr/obj (non-CFIT)

On January 2, 2015, about 1755 central standard time, a Piper PA-34-200T, N81291, was substantially damaged when it impacted trees and terrain during a forced landing near Kuttawa, Kentucky. The commercial pilot, and three passengers were fatally injured, and another passenger was seriously injured. Night instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the personal flight which was conducted under the provisions of 14 Code of Federal Regulations Part 91. The flight departed Tallahassee Regional Airport (TLH), Tallahassee, Florida, around 1500, with the intended destination of Mount Vernon Airport (MVN), Mount Vernon, Illinois.

According to the flight plan filed by the pilot, the proposed departure time was 1500, the estimated time en route was 3 hours and 12 minutes, and the airplane's estimated fuel endurance was 4 hours and 50 minutes.

According to global positioning system (GPS) data, earlier in the day, the pilot performed a flight in the accident airplane that originated from Key West International Airport (EYW), Key West, Florida, around 1145 and terminated at TLH at 1425. According to a fuel receipt from EYW, the pilot had the airport linemen "top all tanks," prior to the departure at 1145. Then, according to a fuel receipt from TLH, the airplane received 67.7 gallons of 100LL aviation fuel prior to departing on the accident flight. In addition, an airport lineman stated that the airplane fuel tanks were "top[ped] off" at that time.

According to air traffic control information provided by the Federal Aviation Administration (FAA), the airplane was about 6,000 feet mean sea level (msl) when the pilot contacted air traffic control at 1750, and requested vectors to the nearest airport reporting visual flight rules (VFR) weather conditions due to "problems" with both engines. The controller advised him that Kentucky Dam State Park Airport (M34) was 11 miles west of his position, at 349 feet elevation. The pilot announced he had the airport in sight, and that the airplane's right engine had stopped producing power. The controller then cleared the airplane for a visual approach. The pilot acknowledged the clearance, advised that he had lost sight of the airport, asked for the airport common traffic advisory frequency, and then stated both engines were malfunctioning. There were no further radio communications from the airplane.

At 1755, after several attempts to contact the airplane, the controller advised that radar contact was lost. The airplane was last observed descending through 2,700 feet msl approximately 10 miles east of M34.

## Pilot Information

<b>Certificate:</b>	Flight Instructor; Commercial	<b>Age:</b>	48, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 Without Waivers/Limitations	<b>Last FAA Medical Exam:</b>	02/04/2014
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	2300 hours (Total, all aircraft), 5.8 hours (Last 24 hours, all aircraft)		

According to FAA records, the pilot held a commercial pilot certificate with ratings for airplane single-engine land, multiengine land, and instrument airplane. In addition, the pilot held a flight instructor certificate for airplane single-engine land, multiengine land, and instrument airplane. His most recent third-class medical certificate was issued on February 4, 2014. At that time, the pilot reported 2,300 hours of total flight experience, which included 50 hours during the previous 6 months. His personal flight logbook was not located.

According to a flight log found at the accident scene, the pilot recorded approximately 14.5 total hours of flight time in the accident airplane since April 10, 2014, which did not include the flights on the day of the accident.

In an interview with local law enforcement, the surviving passenger mentioned that the airplane she customarily rode in with the pilot was in maintenance, and that the accident airplane was not the airplane typically flown by the pilot. The pilot owned and operated a PA-31-350, which was the airplane he "primarily flew." In addition, a local mechanic stated that the pilot only flew the accident airplane a "handful of times" prior to the accident flight.

## Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	Registration:	N81291
Model/Series:	PA34 200T	Aircraft Category:	Airplane
Year of Manufacture:	1979	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	34-8070037
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	03/16/2014, Annual	Certified Max Gross Wt.:	4751 lbs
Time Since Last Inspection:		Engines:	2 Reciprocating
Airframe Total Time:	7573.4 Hours as of last inspection	Engine Manufacturer:	CONT MOTOR
ELT:	C91 installed	Engine Model/Series:	TSIO-360 SER
Registered Owner:	FRO-GUTZ AIR LLC	Rated Power:	210 hp
Operator:	FRO-GUTZ AIR LLC	Operating Certificate(s) Held:	None

According to FAA records, the airplane was manufactured in 1979 and was registered to a corporation on October 29, 2012. It was powered by two Continental Motors Inc. TSIO-360-series, 210-horsepower engines, that were each equipped with a two-bladed Hartzell controllable pitch propeller. The airplane's most recent annual inspection was performed on March 16, 2014, at 7573.4 total aircraft hours.

According to the airplane pilot operating handbook (POH), the airplane was equipped with a total fuel capacity of 128 gallons, of which 5 gallons were unusable. Each wing had two fuel tanks that were interconnected and functioned as a single tank. The fuel tanks on each side were filled through a single filler port in the outboard wing tank. As fuel was consumed from the inboard tank, it was replenished by fuel from the outboard tank.

Fuel management controls were located on the console between the front seats. There was a control lever for each engine that was placarded "ON"- "OFF"- "X FEED." During normal operation, the levers were placed in the "ON" position, and each engine drew fuel from the tanks on the same side as the engine. The two fuel systems were interconnected by crossfeed lines. When the "X FEED" (crossfeed) position was selected, the engine would draw fuel from the tanks on the opposite side in order to extend range and keep fuel weight balanced during single-engine operation. The "OFF" position shut off the fuel flow from the selected side.

Section 4 "Normal Procedures" of the POH stated that during taxi, the pilot was to "check the operation of the fuel management controls by moving each fuel selector to CROSSFEED for a short time, while the other selector is in the ON position. Return the selectors to the ON position. DO NOT attempt a takeoff with the fuel selector on CROSSFEED."

A note in the fuel system description section of the POH stated, "Do not take off with a selector in 'X FEED.'"

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument Conditions	<b>Condition of Light:</b>	Night/Dark
<b>Observation Facility, Elevation:</b>	PAH, 413 ft msl	<b>Distance from Accident Site:</b>	29 Nautical Miles
<b>Observation Time:</b>	1753 CST	<b>Direction from Accident Site:</b>	273°
<b>Lowest Cloud Condition:</b>	Thin Overcast	<b>Visibility</b>	6 Miles
<b>Lowest Ceiling:</b>	Overcast / 600 ft agl	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	6 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	60°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.22 inches Hg	<b>Temperature/Dew Point:</b>	3° C / 3° C
<b>Precipitation and Obscuration:</b>	Moderate - Mist		
<b>Departure Point:</b>	TALLAHASSEE, FL (TLH)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	MOUNT VERNON, IL (MVN)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	1603 EST	<b>Type of Airspace:</b>	

According to Lockheed-Martin Flight Service, no services were provided to the airplane on the day of the accident. The pilot filed his IFR flight plan with an online commercial vendor prior to departure, but there was no evidence that he obtained a weather briefing at that time.

Review of weather data revealed IFR conditions were forecast along the entire route of flight. In addition, airman's meteorological information (AIRMET) advisories for IFR, icing, and mountain obscuration conditions were in effect around the time of the accident. There were several pilot reports of in-flight icing conditions above 14,500 feet with no significant reports of turbulence or icing conditions below that level.

At 1753, the weather conditions reported at Barkley Regional Airport (PAH), 29 miles west of the accident site, at 410 feet elevation included an overcast ceiling at 600 feet and 6 statute miles visibility in mist. The wind was from 060 degrees at 6 knots, the temperature and dew point were 3 degrees C, and the altimeter setting was 30.22 inches of mercury. Rain began at 1725 and ended at 1747.

At 1755, the weather reported at Kyle-Oakley Field Airport (CEY), Murray, Kentucky, 21 nautical miles south of the accident site, at 576 feet elevation included broken ceilings at 600 feet, 5,000 feet and 10,000 feet with 7 statute miles visibility. The temperature was 3 degrees C, the dew point was 3 degrees C, and the altimeter setting was 30.21 inches of mercury.

## Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	3 Fatal, 1 Serious	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Fatal, 1 Serious	Latitude, Longitude:	37.033611, -88.168889

The wreckage was examined at the accident site on January 4, 2015. The airplane impacted trees in a wooded area, about 8 miles east of M34. There was a strong odor of fuel, and all major components of the airplane were accounted for at the scene. The wreckage path was oriented 228 degrees, was approximately 300 feet in length, and at an elevation of 480 feet.

The airplane came to rest inverted with the landing gear retracted. The fuselage and empennage were largely intact, but heavily damaged by impact. All fuel tanks were compromised during the accident and evidence of a small postcrash fire was observed at the right wing outboard fuel tank. As the airplane was being moved for recovery, an undetermined amount of fuel was noted flowing out of the inboard section of the left wing. Flight control continuity was confirmed from all flight control surfaces to the cockpit through tensile overload breaks and cuts to control cables made by recovery personnel. Examination of the cockpit and cabin areas revealed that both control yokes were attached to their respective columns and that the throttle, mixture, and propeller levers were intact in the throttle quadrant, and in the full forward position. The yaw trim actuator was observed in the full nose-right position, and the stabilator trim actuator was observed in the neutral position. The airplane was not equipped with aileron trim. The cockpit fuel selectors indicated that the left engine was in the "X-FEED" position and the right engine was in-between the "ON" and "OFF" position. The fuel selector valve positions in the wings were examined and indicated that the left engine was in the "X-FEED" position and the right engine was in the "ON" position.

The seats were anchored in their mounts, the seatbelts were buckled, and all were cut by rescue personnel with the exception of the forward-facing right aft seat belt, which was intact and unbuckled.

The left engine was separated from its engine mounts but remained attached to the left wing through wires and cables. The left engine turbocharger was removed from the engine and examined. Rotational scoring was noted on the interior of the turbocharger near the turbine vanes. The left propeller was separated from the left engine and was in the vicinity of the main wreckage. One propeller blade exhibited a slight s-bend, and the other propeller blade exhibited chordwise scratching. The spinner was impact damaged.

The right engine remained attached to its engine mounts and was attached to the right wing. The engine cowl was removed to facilitate further examination. All major engine components remained attached to the engine. The right propeller was separated from the right engine and was located forward of and in the vicinity of the right engine. The right propeller spinner exhibited impact damage and both propeller blades were bent in the aft direction.

A detailed examination of the airplane was conducted at a recovery facility in Springfield, Tennessee. In addition, each engine was retained for further examination at Continental Motors Inc., Mobile, Alabama, under the supervision of an NTSB investigator.

Compressed air was applied into the fuel system from the base of each wing toward to outboard section of the wing, and there were no blockages noted in either wing. In addition, the fuel selectors, crossfeed functions, and fuel lines in the fuselage were tested with compressed air and no blockages were noted. There were no blockages or anomalies identified in the fuel system that would have precluded normal operation prior to the accident.

Subsequent examination of the left engine revealed impact damage to the exhaust system, engine driven fuel pump, turbocharger, and the No. 5 cylinder, which precluded functional testing of the engine in a test cell. Both magnetos were rotated and produced spark on all towers. The fuel pump was disassembled with no anomalies noted. The fuel manifold valve was examined with no anomalies noted. The vacuum pump was disassembled and all vanes were intact. Overall, examination and testing of the engine and its components revealed no preimpact anomalies that would have precluded normal operation of the engine prior to the accident.

The right engine was functionally checked in a test cell where it started immediately, accelerated smoothly, and ran continuously without interruption.

Additional examination of both propellers revealed that neither propeller was in the feathered position, and that both exhibited similar impact damage. Disassembly of both propeller systems revealed no anomalies that would have precluded normal operation prior to the accident.

## Communications

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The pilot contacted Memphis Air Route Traffic Control Center at 1747:10, and reported descending to 6,000 feet msl, from 6,700 feet msl. At 1750:48, the pilot reported "...I've got problems" and requested vectors to the nearest VFR airport. At 1752:01, the pilot transmitted "I don't know what's wrong...both engines are malfunctioning – everything's forward it was running perfect I have fuel I just don't know the right engine is out."

At 1754:14, the pilot stated the "engines are not producing power I don't know what's up." At 1754:43, the pilot asked if there were any nearby suitable landing areas, and at 1755:06, radar contact was lost. There were no further communications with the airplane.

## Medical And Pathological Information

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The Office the Chief Medical Examiner for the State of Kentucky performed an autopsy on the pilot in Louisville, Kentucky. The pilot's autopsy report indicated the cause of death was "multiple blunt force injuries."

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing of the pilot. Fluid and tissue specimens from the pilot tested negative for carbon monoxide and ethanol. However, the testing detected citalopram and its metabolite, n-desmethylcitalopram, in the urine and blood. Also, rosuvastatin was detected in the urine.

Citalopram was an antidepressant with selective serotonin reuptake inhibiting action. Rosuvastatin was a member of the drug class of statins, used to treat high cholesterol and related conditions, and to prevent cardiovascular disease.

## Tests And Research

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### Non-Volatile Memory Devices

A Garmin 696 GPS, a Garmin 496 GPS, and an Apple iPhone 5s were retained from the wreckage and sent to the NTSB Recorders Laboratory for data download. No data pertinent to the accident was obtained from the Apple iPhone 5s. Both the Garmin 696 GPS and Garmin 496 GPS recorded data from the accident flight.

According to GPS data, the units began recording, and then about 5 minutes later, the airplane departed TLH at 1500. It was noted that about 3 minutes elapsed between the time the airplane began to taxi and when the takeoff roll began. In addition, in that 3-minute timeframe the airplane was in constant motion. At 1750:16, at a recorded altitude of about 5,000 feet msl, the airplane slowed from about 160 knots to 142 knots groundspeed and began a descent. The descent continued, and the airplane slowed to about 100 knots for the remainder of the flight.

At 1751:25, the airplane turned to a westerly heading and continued to descend. Both GPS receivers stopped recording data at 1754 and approximately 700 feet GPS altitude.

## Additional Information

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### Normal Procedures Checklist

According to a checklist found at the accident site, the checklist items associated with the fuel system included:

After Engine Start, item number 12, "Fuel Selectors – Crossfeed." Then, during the engine run up, item number 1 stated "Fuel Selectors – ON." Finally, the Top of Climb/Cruise Checklist indicated that item number 2 stated "Mixtures – Lean."

### Fuel Performance Calculations

According to the POH, fuel usage for engine start, taxi, and takeoff was 4.2 gallons of fuel. Interpolation of performance charts revealed that the engines burned approximately 20 gallons per hour. Furthermore, the fuel consumption calculated on the previous flight was about 20 gallons per hour. An estimate of the airplane's fuel consumption during the accident flight revealed that the 2 hours and 55 minutes that had elapsed from the time of departure to the time of the accident would have consumed about 60 gallons of fuel, which included the fuel needed for engine start, taxi, and takeoff.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Heidi Moats	<b>Report Date:</b>	12/15/2016
<b>Additional Participating Persons:</b>	Chuck Holsclaw; FAA/FSDO; Louisville, KY Chris Lang; Continental Motors Inc.; Mobile, AL Ron Maynard; Piper Aircraft; Vero Beach, FL Les Doud; Hartzell Propeller; Piqua, OH		
<b>Publish Date:</b>	12/15/2016		
<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=90558">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=90558</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](#).