National Transportation Safety Board
Aviation Accident Final Report

Location:	Weston, FL	**Accident Number:**	ERA16LA026
Date & Time:	10/26/2015, 1233 EDT	**Registration:**	N55GK
Aircraft:	PIPER PA31	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Fatal, 1 Minor, 1 None
Flight Conducted Under:	Part 91: General Aviation - Business		

Analysis

The airline transport pilot of the multiengine airplane had fueled the main (inboard) fuel tanks to capacity before the cross-county flight. As the flight approached the destination airport, an air traffic controller instructed the pilot to turn right for a visual approach, and the pilot acknowledged. Subsequently, the pilot reported that he might have to land on a highway. The airplane impacted a marsh area about 15 miles from the destination airport.

Review of data downloaded from an onboard engine monitor revealed that the right engine momentarily lost and regained power before experiencing a total loss of power. Examination of the wreckage revealed that the left propeller was feathered and that the right propeller was in the normal operating range. Sufficient fuel to complete the flight was drained from the left wing fuel tanks. Although the right wing fuel tanks were compromised during the impact, sufficient fuel was likely present in the right main fuel tanks to complete the flight before impact because both the left and right main fuel tanks were fueled to capacity concurrently before the flight, but it likely was in a low fuel state due to fuel used during the flight.

The right wing main fuel tank was not equipped with a flapper valve, which should have been located on the baffle nearest the wing root where the fuel pickup was located. The flapper valve is used to trap fuel near the fuel pickup and prevent it from flowing outboard away from the pickup. The maintenance records did not indicate that the right main fuel tank bladder had been replaced; however, the manufacture year printed on the bladder was about 20 years before the accident and 16 years after the manufacture of the airplane, indicating that the bladder had been replaced at some point. When the right main fuel tank bladder was replaced, the flapper valve would have been removed. Based on the evidence, it is likely that maintenance personnel failed to reinstall the flapper valve after installing the new fuel bladder. This missing valve would not affect operation of the fuel system unless the right main fuel tank was in a low fuel state, when fuel could flow outboard away from the fuel pickup (such as in a right turn, which the pilot was making when the engine lost power), and result in fuel starvation to the engine.

Toxicology testing of the pilot revealed that his blood alcohol level during the flight was likely between 0.077 gm/dl and 0.177 gm/dl, which is above the level generally considered impairing.

Therefore, it is likely that, during the right turn, the fuel in the right main fuel tank moved outboard, which resulted in fuel starvation to the right engine. When the right engine lost power, the pilot should have secured the right engine by feathering the propeller to reduce drag and increase single-engine performance; however, given the position of the propellers at the accident site, the pilot likely incorrectly feathered the operating (left) engine, which rendered the airplane incapable of maintaining altitude. It is very likely that the pilot's impairment due to his ingestion of alcohol led to his errors and 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 feathering of the incorrect propeller following a total loss of right engine power due to fuel starvation, which resulted from maintenance personnel's failure to reinstall the flapper valve in the right main fuel tank. Contributing to the accident was the pilot's impairment due to alcohol consumption.

Findings

Aircraft	Propeller feather/reversing - Incorrect use/operation (Cause)
	Fuel system - Not specified (Cause)
Personnel issues	Incorrect action selection - Pilot (Cause)
	Installation - Maintenance personnel (Cause)
	Alcohol - Pilot (Factor)

Factual Information

History of Flight

Approach	Fuel starvation Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing	Collision with terr/obj (non-CFIT)

On October 26, 2015, at 1233 eastern daylight time, a Piper PA-31-350, N55GK, was substantially damaged during a forced landing to a marsh in Weston, Florida, while on approach to Fort Lauderdale Executive Airport (FXE), Fort Lauderdale, Florida. The airline transport pilot was fatally injured, one passenger incurred minor injuries, and one passenger was not injured. The business flight was operated by Spohrer & Dodd Aviation LLC., and conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed in the area, and an instrument flight rules flight plan was filed for the flight, which departed Jacksonville Executive Airport (CRG), Jacksonville, Florida, about 1033.

According to a fueling receipt and statements from the passengers, the flight originated from Herlong Recreational Airport (HEG), Jacksonville, Florida, about 1010. Before departure, the airplane was fueled with 17.3 gallons of 100 low-lead aviation gasoline, which brought the fuel quantity in the main fuel tanks to full. No fuel was added to the auxiliary fuel tanks at this time. The flight departed for FXE but diverted to CRG due to a cockpit window that was not properly closed. The pilot secured the window at CRG and departed on the accident flight.

According to information from the Federal Aviation Administration (FAA), the flight was in radio and radar contact with air traffic control (Miami Approach) while being vectored for a visual approach to runway 9 at FXE. At 1230, the air traffic controller instructed the flight to descend from 3,000 ft to 2,000 ft mean sea level (msl), which the pilot acknowledged. The controller subsequently instructed the pilot to turn right from a heading of 160° to 180°, which the pilot acknowledged. About 1 minute later, the controller instructed the pilot to turn left to a heading of 090° and report the airport in sight. The pilot acknowledged the vector but did not initiate a left turn. About 20 seconds later, the controller asked whether the pilot was turning left, and the pilot replied that he might have to land on the interstate highway. He then asked where the airport was, and the controller told him it was 15 miles east. At 1233:28, the pilot reported that he saw the interstate highway. No further communications were received from the airplane.

Review of radar data revealed that the airplane entered a right turn about 1230 and then continued on a straight course of about 180° magnetic from approximately 1232:18, when the airplane was at 2,000 ft msl, until the last radar target was recorded at 1233:41, when the airplane was at 200 ft msl. Further review of the radar data revealed that the majority of the cruise portion of the flight was flown about 40 knots slower than the final portion of the flight.

The data indicated about 120 knots groundspeed from 1045 to 1154, then 160 knots groundspeed from 1155 until 1213, when the descent from cruise altitude began.

Pilot Information

Certificate:	Airline Transport; Flight Instructor	**Age:**	63, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
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 2 With Waivers/Limitations	**Last FAA Medical Exam:**	04/27/2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	11000 hours (Total, all aircraft), 105 hours (Total, this make and model)		

The pilot held an airline transport pilot certificate with ratings for airplane single-engine land and airplane multiengine land. He also held a flight instructor certificate with ratings for airplane single-engine, airplane multiengine, and instrument airplane. The pilot's most recent FAA second-class medical certificate was issued on April 27, 2015. At that time, he reported a total flight experience of 11,000 hours. Review of the pilot's most recent logbook revealed that he had accumulated about 6,379 hours of multiengine flight experience; of which, 105 hours were flown in the accident airplane, dating back to 2006.

Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	**Registration:**	N55GK
Model/Series:	PA31 350	**Aircraft Category:**	Airplane
Year of Manufacture:	1977	**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	31-7852013
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	06/08/2015, Annual	**Certified Max Gross Wt.:**	7000 lbs
Time Since Last Inspection:	3 Hours	**Engines:**	2 Reciprocating
Airframe Total Time:	6003.3 Hours at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	TIO-540
Registered Owner:	SPOHRER & DODD AVIATION LLC	**Rated Power:**	350 hp
Operator:	SPOHRER & DODD AVIATION LLC	**Operating Certificate(s) Held:**	None

The eight-seat, low-wing, retractable-gear airplane, serial number 31-7852013, was manufactured in 1978. It was powered by two Lycoming TIO-540, 350-hp engines equipped with Hartzell propellers. According to maintenance records, the airplane's most recent annual inspection was completed on June 8, 2015. At that time, the airframe had accumulated 6,003.3 total hours of operation and each of the engines had accumulated 1,260.2 hours since major overhaul. At the time of the accident, the airplane had flown 2.9 hours since the annual inspection.

The airplane's fuel system consisted of four fuel bladder tanks. Each wing was equipped with an inboard main fuel tank and an outboard auxiliary fuel tank. Each main fuel tank held 56 gallons and each auxiliary fuel tank held 40 gallons, totaling 192 gallons, of which, 182 gallons were useable. Each main fuel tank was equipped with a flapper valve located on the baffle nearest the wing root, where the fuel pickup was located. The purpose of the flapper was to trap fuel near the fuel pickup and prevent it from flowing outboard, away from the pickup. When the main fuel tank bladders were replaced, the flapper valve would have to be removed and reinstalled. The manufacture year printed on the right main fuel tank bladder was 1994.

Review of FAA records revealed that the operator purchased the airplane in 2008. A previous owner sold the airplane to a company in Guatemala on May 13, 1992. The airplane was then sold to a company in Florida on November 29, 1999. Further review of the airframe logbooks did not reveal any entries regarding removal and replacement of the right main fuel tank bladder; therefore, the location and date of the bladder replacement could not be determined. Further review of maintenance records revealed that the left main fuel tank bladder was removed and replaced in 2004.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	FXE, 13 ft msl	**Distance from Accident Site:**	16 Nautical Miles
Observation Time:	1253 EDT	**Direction from Accident Site:**	60°
Lowest Cloud Condition:	Few / 3300 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	16 knots / 20 knots	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	110°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	29°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Jacksonville, FL (CRG)	**Type of Flight Plan Filed:**	IFR
Destination:	Fort Lauderdale, FL (FXE)	**Type of Clearance:**	IFR
Departure Time:	1033 EDT	**Type of Airspace:**	

The 1253 recorded weather at FXE included wind from 110° at 16 knots gusting to 20 knots; visibility 10 miles; few clouds at 3,300 ft, scattered clouds at 4,100 ft, scattered clouds at 5,500 ft; temperature 29°C; dew point 20°C, altimeter 30.03 inches Hg.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor, 1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Minor, 1 None	**Latitude, Longitude:**	26.058889, -80.434722 (est)

Examination of the wreckage by an FAA inspector revealed that it came to rest upright in a marsh. The landing gear was retracted, and both engines had separated from their respective wings. The right wing outboard section and the left wingtip had also separated. The left engine fuel selector was positioned to the left auxiliary fuel tank, and the right engine fuel selector was positioned to the right main fuel tank. The inspector observed fuel in both the left main and left auxiliary fuel tanks. About 13 gallons of fuel were then drained from the left wing via a large fuel line behind the left engine, which simultaneously drained fuel from both left wing fuel tanks. The inspector did not observe fuel in the right main or right auxiliary fuel tanks; however, the right auxiliary fuel tank was compromised during impact, and the inspector could

not confirm the integrity of the right main fuel tank due to the position of the wreckage.

The wreckage was re-examined at a recovery facility. Review of the cockpit revealed that the pilot's seatbelt and shoulder harness remained intact. The throttle, mixture, and propeller levers for both engines were in the forward positions; however, the control pedestal was canted right, consistent with movement by first responders to extricate the pilot. The battery master, both engine magnetos, and the emergency fuel boost pumps were on. The alternator switches were in the off positions. Although the right engine firewall fuel shut-off lever was partially engaged, the fuel valve was open at the wing root, consistent with lever movement during impact or by rescue personnel.

The wing flaps were in the retracted position. Measurement of the rudder trim jackscrew corresponded to a full nose-right rudder position. Measurement of the elevator trim jackscrew corresponded to an approximate neutral setting. Measurement of the aileron trim jackscrew corresponded to an approximate 1/4-scale right aileron trim setting. Control continuity was confirmed from the ailerons, rudder, and elevator to the mid-cabin area. In addition to the breached right wing auxiliary fuel tank, the right wing main fuel tank bladder was ruptured, consistent with impact. The breach in the right main wing fuel tank bladder was an approximate 1-inch tear near the fuel vent. The right wing main fuel tank flapper valve was absent; the left wing main fuel tank flapper valve was installed.

The valve covers, top spark plugs, oil filter, and vacuum pump were removed from the left engine. The spark plug electrodes were intact and light gray in color. The vacuum pump vanes and drive coupling were intact. When the propeller was rotated by hand, crankshaft, camshaft, and valve train continuity were confirmed to the rear accessory section, and thumb compression was obtained on all cylinders. The fuel injector servo and dual magneto were also removed. The fuel injector servo screen was absent of debris. No fuel was recovered from the fuel injector servo, fuel lines, or engine-driven fuel pump. The dual magneto shaft was rotated via an electric drill, and spark was observed at all 12 leads.

The valve covers, top spark plugs, oil filter, starter, and vacuum pump were removed from the right engine. The spark plug electrodes were intact and light gray in color. The vacuum pump vanes and drive coupling were intact. When the propeller was rotated by hand, crankshaft, camshaft, and valve train continuity were confirmed to the rear accessory section, and thumb compression was obtained on all cylinders. The fuel injector servo and dual magneto were also removed. The fuel injector servo screen was absent of debris. Fuel was recovered from the fuel injector servo and engine-driven fuel pump. The dual magneto shaft was rotated via an electric drill, and spark was observed at all 12 leads.

Teardown examination of both propellers revealed that the four left propeller blades remained attached to the hub. Three blades were bent aft, and one was bent forward. All four blades exhibited leading edge gouging and chordwise scratching consistent with powered rotation at impact. All four left propeller blades were found in the feather position.

The four right propeller blades remained attached to the hub. All four blades were bent aft and exhibited rotational scoring and leading edge damage; however, the damage was less than the

damage observed on the left propeller blades. The right propeller blades were found in a normal operating position near the low pitch stop.

Medical And Pathological Information

The 63-year-old male pilot had reported to the FAA chronic obstructive pulmonary disease (COPD) and the use of an inhaled combination medication containing budesonide and formoterol to limit his symptoms. This combination of a steroid and long acting beta-agonist is not considered impairing. He was issued a time-limited special issuance second class medical certificate with a limitation for corrective lenses for near and distant vision and marked, "Not valid for any class after 04/30/2016."

The Office of the Medical Examiner & Trauma Services, Broward County, Florida, determined the pilot's cause of death was multiple blunt force injuries and the manner of death was accident. A specimen of blood was drawn on the day of the accident by the treating hospital for toxicological testing at the FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. Testing identified acetone, methanol at 0.003 gm/dl, and ethanol at 0.037 gm/dl in blood. In small amounts, acetone and methanol are not considered impairing. Assuming that the blood sample tested was drawn on admission to the hospital at 1400 (and not later), the pilot's level of ethanol at the time of departure at 1010 was likely between 0.077 gm/dl and 0.177 gm/dl.

Additional Information

A JPI engine monitor and Shadin fuel flow indicator were removed from the airplane and forwarded to the NTSB Vehicle Recorder Laboratory, Washington, DC. Data were successfully downloaded from both units. The Shadin fuel flow indicator displayed 561.4 gallons of fuel used with 0.0 gallons of fuel remaining; however, the unit had to be manually reset after every fueling for accurate information.

Review of plotted data from the JPI engine monitor revealed that the right engine exhaust gas temperature (EGT) decreased from about 1,300°F to 800°F at 1225:15 (the JPI clock was about 5 minutes behind the ATC clock), then increased to 1200°F at 1225:25, followed by a decrease to 200°F at 1226:00, which was about the time the airplane was making a right turn from a course of 160° to 180° magnetic. The left engine exhaust gas temperature remained between 1,150°F to 1,400°F throughout the data to 1228:40. The particular model JPI engine monitor did not store fuel flow or fuel quantity information.

Administrative Information

Investigator In Charge (IIC):	Robert J Gretz	**Report Date:**	04/09/2018
Additional Participating Persons:	Juan Garcia; FAA/FSDO; Miramar, FL Damian Galbraith; Piper Aircraft; Vero Beach, FL James Childers; Lycoming Engines; Williamsport, PA Les Doud; Hartzell Propeller; Piqua, OH		
Publish Date:	04/09/2018		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=92231		