



National Transportation Safety Board Aviation Accident Factual Report

Location:	Odessa, FL	Accident Number:	WPR18LA040
Date & Time:	11/25/2017, 1420 EST	Registration:	N57351
Aircraft:	PIPER PA-28	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (total)	Injuries:	1 Minor
Flight Conducted Under:	Part 91: General Aviation - Personal		

On November 25, 2017, about 1420 eastern standard time, a Piper PA28-140 airplane, N57351, was substantially damaged during a forced landing near Odessa, Florida. The private pilot sustained minor injuries. The airplane was registered to and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed at the time of the accident and no flight plan was filed. The flight originated from Tampa Executive Airport (VDF) Tampa, Florida, about 1340.

According to the pilot, the right tank was full and the left tank was "just under half" during his preflight inspection, and he then departed from VDF for a local flight via the Clearwater Beach area. After reaching that area the pilot turned around to return to VDF. The flight was being conducted on the left fuel tank, at an altitude of about 2,500 ft. After the turnaround, the pilot switched off the electric fuel pump. About 5 minutes later, the engine lost power; the pilot reported that the engine speed dropped to about 700 rpm and remained at that value. The pilot reported that he had been airborne about 40 minutes, and that he attempted to maintain "about 80 mph" after the engine power loss. He turned on the electric fuel pump, but the engine did not regain power. He switched to the right fuel tank and manipulated the throttle, but again, engine power was not restored. The pilot then selected an open field that he deemed suitable for a forced landing. During his approach to the field, the pilot switched the fuel selector back to the left tank, again to no avail.

The field was bounded by two sets of powerlines; the pilot's initial assessment was that he could overfly both sets. As the pilot overflew the first set, he determined that the airplane would not clear the second set, so he then maneuvered the airplane to fly under the second set of powerlines. The right wing of the airplane struck a pole supporting the powerlines, and the airplane came to rest in the field a few hundred feet beyond the struck pole.

Post accident examination of the airplane by recovery personnel revealed that the left fuel tank was empty, the right fuel tank was nearly full, and the fuel selector was set to the left tank. The wreckage was recovered to a secure facility for additional examination.

Pilot Information

Certificate:	Private	Age:	72, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 With Waivers/Limitations	Last FAA Medical Exam:	01/15/2017
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	149 hours (Total, all aircraft), 142 hours (Total, this make and model)		

The pilot held a private pilot certificate with an airplane single engine land rating. He reported a total flight experience of about 149 hours, of which about 142 hours were in the accident airplane make and model. His pilot certificate was issued in September 2015, and his most recent Federal Aviation Administration (FAA) third-class medical certificate was issued in January 2017. The pilot did not report the date of his most recent flight review.

Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	Registration:	N57351
Model/Series:	PA-28 140	Aircraft Category:	Airplane
Year of Manufacture:	1973	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	28-7425097
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	06/01/2017, Annual	Certified Max Gross Wt.:	2150 lbs
Time Since Last Inspection:	10 Hours	Engines:	1 Reciprocating
Airframe Total Time:	4722 Hours as of last inspection	Engine Manufacturer:	LYCOMING
ELT:	Installed, not activated	Engine Model/Series:	O-320 SERIES
Registered Owner:	On file	Rated Power:	160 hp
Operator:	On file	Operating Certificate(s) Held:	None

The airplane was manufactured in 1973, and was equipped with a Lycoming O-320 series engine. According to the pilot, the airplane and engine had accumulated a total time in service of about 4,722 hours, and the engine had accumulated about 638 hours since its most recent

overhaul. The most recent annual inspection was completed in June 2017.

According to the pilot, he "had never had" an engine power problem since he purchased the airplane in 2015. He reported that in the two annual inspections that he had on the airplane, there were "never any recommendations regarding the fuel system." He also reported that about a year before the accident, he had noted that the left fuel tank was leaking fuel via the sump/sample valve, and that he corrected that situation by manipulating the valve to ensure that it was closed. He reported that he had never had a recurrence of that event.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	TPA	Distance from Accident Site:	12 Nautical Miles
Observation Time:	1853 EST	Direction from Accident Site:	135°
Lowest Cloud Condition:	Few / 23000 ft agl	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	240°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.99 inches Hg	Temperature/Dew Point:	23°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tampa, FL (VDF)	Type of Flight Plan Filed:	None
Destination:	Tampa, FL (VDF)	Type of Clearance:	None
Departure Time:	1340 EST	Type of Airspace:	Class E

The 1853 and 1953 automated weather observations from Tampa International Airport (TPA), Tampa, Florida, located about 12 miles southeast of the accident site, included winds from 250° at 7 knots, visibility 10 miles, few clouds at 4,500 ft, temperature 23°C, dew point about 14°C, and an altimeter setting of 29.99 inches of mercury.

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Minor	Latitude, Longitude:	28.158611, -82.638056 (est)

The airplane came to rest upright in a field; accident site elevation was about 50 ft above mean sea level. The nose landing gear had failed, both propeller blades were bent aft about midspan, and a 5 ft section of the outboard right wing was almost completely fracture-separated from the rest of the wing. On January 18, 2018, the airplane was examined and tested by NTSB and Piper personnel. Visual inspection of the engine revealed that it appeared intact. The top spark plugs were removed; all were gray in color, and exhibited normal wear characteristics. The cylinders were examined with a lighted borescope. All valves and pistons were normal in appearance, with no defects noted.

The fuel selector valve was removed and disassembled; no defects were observed. An external fuel tank was connected to the inlet side of the gascolator. The engine was primed normally using the primer, and the electric fuel pump operated normally and pumped fuel to the engine. Because the airplane battery was found to be weak, an electrical booster was used to provide the electrical power necessary to crank the engine.

After several revolutions the engine started successfully, and idled without problems. The throttle and mixture controls moved smoothly and correctly, and all electrical switches operated normally. After engine start, it was noted that the oil pressure gauge line was fractured, and was leaking oil. The engine was shut down at that point. No other mechanical anomalies or problems were noted with the engine.

Additional Information

Fuel System Information

The airplane was equipped with two fuel tanks, one in each wing. The left and right tanks were mounted forward of their respective forward spars, on the inboard wing section. The airplane manufacturer's Pilot's Operating Manual (POM) stated that the fuel capacity was 25 gallons per tank, with 24 gallons usable per tank. The fuel selector valve could be set to OFF, or either the left or right tank; there was no BOTH setting.

Each tank was equipped with a single fuel pickup (outlet) on its inboard wall, slightly above the bottom of the tank. According to the POM Operating Tips section, the shape of the wing fuel tanks is such that in certain maneuvers the fuel may move away from the tank outlet. If the

outlet is uncovered (unported), the fuel flow to the engine will be interrupted and a temporary loss of power may result. The less fuel in a particular tank, the higher the potential for unporting the fuel pickup in that tank.

An electric (sometimes referred to as "boost" or "auxiliary") fuel pump was plumbed in parallel with the engine driven fuel pump. The POM stated that the electric fuel pump "is provided for use in case of failure of the engine driven pump. The electric pump should be on for all takeoffs and landings and when switching tanks."

Fueling and Fuel Consumption Information

The pilot provided fuel records which indicated that he took on 34.8 gallons on November 5, 2017 at VDF, his home airport. He stated that that fueling filled both tanks. The pilot reported that he did not fly "that often so I usually keep both tanks full," and that he usually began his flights using fuel from the left tank.

According to the FAA inspector assigned to this investigation, the pilot told him that he had one previous flight between the refueling and the accident flight. That previous flight lasted about 1.5 hours, and was conducted using fuel only from the left tank. The accident flight duration was variously cited as being between about 40 minutes and 1 hour, again using fuel only from the left tank.

The POM cruise performance charts cited fuel consumption rates between 6.2 and 8.4 gallons per hour. These values were for best power with the engine leaned per Lycoming instructions; fuel consumption rates would increase with no or improper leaning, but the POM did not provide data for those cases. Although the POM did not provide takeoff and climb fuel consumption rates, review of the applicable Lycoming engine performance chart indicated that at full throttle (the setting used for takeoff and climb) the fuel consumption rate for takeoff and climb would be about 60% higher than the POM fuel consumption rate for cruise.

Power Loss in Flight

The POM Emergency Procedures Section presented the following verbatim information:

Complete engine power loss is usually caused by fuel flow interruption, and power will be restored shortly after fuel flow is restored. If power loss occurs at low altitude, the first step is to prepare for an emergency landing (See POWER OFF LANDING). Maintain an airspeed of at least 80 MPH IAS, and if altitude permits, proceed as follows:

1. Fuel Selector - Switch to another tank containing fuel.
2. Electric Fuel Pump - On
3. Mixture - Rich
4. Carburetor Heat - On
5. Engine Gauges - Check for indication of the cause of power loss.
6. Primer - Check Locked
7. If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

The POM then stated "If engine failure was caused by fuel exhaustion, power will not be restored after tanks are switched until empty fuel lines are filled, which may require up to ten seconds."

The pilot provided a copy of the "Engine Failure During Flight" Emergency Procedures checklist that he kept "hanging in the cockpit" of the airplane. The checklist bore the branding "Little Creek Aviation, Inc" but its origin beyond that was not determined. The sequence of this checklist was different than that published by the airplane manufacturer.

The specific steps enumerated by the pilot's checklist were:

1. Airspeed – 83 MPH
2. Carburetor Heat – ON
3. Fuel Selector Valve – SWITCH TANKS
4. Mixture – RICH
5. Master Switch – ON
6. Auxiliary Fuel Pump – ON
7. Ignition Switch – BOTH
8. Primer – IN & LOCKED

This checklist contained the exact same sentence as the POM did regarding engine failure due to fuel exhaustion.

Pilot Actions

According to the pilot, he did not use any engine failure checklist after the power loss, but he did turn on the electric fuel pump, observed normal fuel pressure, and switched tanks. He did not report turning the ignition switch to the START position, but the propeller was still windmilling. He reported that he waited about 10 seconds after activating the electric fuel pump before he switched to the right fuel tank, and that it was "about halfway" in time between the power loss and landing when he switched back to the left tank. The pilot reported that it was "probably about 30 seconds" after the power loss that he turned his attention from restarting the engine to focusing on a forced landing. He reported that he "could not even guess" whether the time from the engine power loss to touchdown "was one minute or five minutes."

Glide Descent Time

According to the POM Glide Performance chart, when flown at the best glide speed from the pilot-reported altitude of 2,500 ft, the airplane had a zero-wind estimated glide range of 5 statute miles. Calculations based on ideal pilot and airplane performance indicate that the descent rate would be about 739 ft per minute (fpm), which would yield a glide time of about 3.4 minutes. Any airplane turns, or deviations from ideal pilot and airplane performance, would decrease the glide duration.

Administrative Information

Investigator In Charge (IIC):	Michael C Huhn
Additional Participating Persons:	Roy Hardie; FAA; Tampa, FL
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=96396