Aviation Investigation Final Report

Location:	Brainerd, Minnesota	**Accident Number:**	CEN18LA302
Date & Time:	July 30, 2018, 10:00 Local	**Registration:**	N1856W
Aircraft:	Beech A36	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and passenger were on a 2-hour personal flight. Midway to the destination, the pilot switched the fuel selector from the right fuel tank to the left fuel tank. While on a visual approach about 1 hour later, the engine lost power. The pilot's attempts to restart the engine were unsuccessful, and he made a forced landing into trees, which resulted in damage to both wings.

One week before the accident, while the pilot was flying the same route, the engine lost power while on a visual approach. The pilot switched the fuel selector from the left tank to the right tank and landed uneventfully. After landing, he switched from the right tank to the left tank and repeated the process twice; the engine lost power both times with the left tank selected. Maintenance personnel were unable to determine a cause for the power loss events, and the pilot flew the airplane back to his home airport without incident. The accident occurred on the next flight.

A review of engine data indicated that the four power loss events occurred when the left fuel tank was about half full (19 gallons) and that they were consistent with an interruption of fuel supply to the engine.

Examination of the fuel system revealed that the fuel selector left detent was worn; however, because both in-flight power loss events occurred without the pilot moving the fuel selector, this issue is not relevant to the accident. No other anomalies were found with the fuel system, including the left-wing fuel tank (bladder) or venting system.

Although the investigation was unable to identify any anomalies with the left fuel tank and venting system, the circumstances of the power loss events are consistent with a loss of fuel flow from the left tank.

Probable Cause and Findings

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

Total loss of engine power due to a fuel supply interruption from the left tank for reasons that could not be determined, which resulted in the subsequent forced landing into trees.

Findings

Aircraft	(general) - Malfunction
Environmental issues	Tree(s) - Contributed to outcome

Factual Information

History of Flight

Approach-VFR pattern final	Loss of engine power (total) (Defining event)
Landing	Off-field or emergency landing

On July 30, 2018, about 1000 central daylight time, a Beech A36 airplane, N1856W, impacted terrain while on a visual approach to Brainerd Lakes Regional Airport (BRD), Brainerd, Minnesota. The pilot and passenger were not injured, and the airplane was substantially damaged. The airplane was registered to and operated by the private individual under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight.

The pilot stated that during preflight, both fuel tanks contained about 37 gallons of fuel. He departed Poplar Grove Airport (C77), Poplar Grove, Illinois, about 0807 with the right tank selected and flew toward BRD for about an hour, then selected the left fuel tank. About two miles prior to landing at BRD, the engine sputtered and lost power. The pilot attempted several corrective actions, to include selecting the right fuel tank and increasing the mixture control, with no effect. The pilot executed a forced landing into birch trees, which damaged both wings. The airplane came to rest nose down, and the pilot and passenger exited the airplane out of a passenger window.

One week prior to the accident, while in cruise flight between C77 and BRD, the pilot noticed the engine sputter momentarily after he moved the fuel selector from the right to left fuel tank. About an hour later, engine began to sputter during the approach to BRD. The pilot selected the right fuel tank and turned on the electric boost pump. The engine ran smoothly, and the pilot landed uneventfully.

While on the taxiway, the pilot attempted to troubleshoot the issue by selecting the left fuel tank, which resulted in the engine sputtering and stopping. The pilot restarted the engine with the right fuel tank selected and taxied to parking. While in parking, he selected the left fuel tank and the engine stopped again.

A mechanic at BRD attempted to identify a cause for the engine stoppages. The fuel lines forward of the firewall were visually inspected, with no anomalies noted. The engine driven and electric boost pumps operated normally. No fuel pressure anomalies were noted during an engine test run. After conducting several landings at BRD, the pilot returned to C77 without incident.

A review of the J.P. Instruments EDM-700 data indicated that the power loss that occurred during both flights and on the ground was consistent with a loss of fuel supply to the engine. Fuel consumed was about 36 gallons when all the power loss events occurred, with about 19 gallons of fuel present in the left fuel tank.

Examination of the airplane and fuel systems at the recovery facility revealed the fuel selector was in the right tank position and the throttle, mixture, and propeller controls were all pushed full forward, with

normal continuity. The engine had normal continuity during manual rotation and no anomalies were noted during borescope inspection of the cylinders.

The engine driven fuel pump rotated freely, with no fuel present in the pump cavity. The pump drive and impeller blades were intact and exhibited normal wear patterns. The fuel screen was absent contamination. Both fuel tank cap seals were in good condition. The electric boost pump was checked at low- and high-pressure settings, with and without fuel. No anomalies were noted.

The left tank fuel vent one-way check valve was clear and installed correctly. Air pressure was blown through the fuel vent line, with no restrictions. Although only one gallon of fuel was drained from the left tank, fuel was observed leaking out of the left-wing fuel vent at the accident site before the airplane was recovered.

The left-wing fuel bladder attachments were in place and the flapper valve operated normally, with no blockages to the fuel return or vent openings. The bladder was removed from the wing and found to be in normal condition, with a small amount of debris inside. The bladder was filled with 38 gallons of water and did not leak.

The fuel selector left detent was worn. During the examination when the fuel selector handle was manipulated within the worn detent area, fuel flow became turbulent. Fuel flow reduced to a trickle when the handle was moved beyond the center of the detent. At a test pressure of 3.1 psi, fuel flow in the left and right detent positions was 76 and 94 lbs. per hour, respectively. Without manual manipulation of the fuel selector, the valve would not move out of the detent position.

Pilot Information

Certificate:	Private	**Age:**	64,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	February 1, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 8, 2018
Flight Time:	3400 hours (Total, all aircraft), 2907 hours (Total, this make and model), 3170 hours (Pilot In Command, all aircraft), 30 hours (Last 90 days, all aircraft), 26 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		**Age:**	Female
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N1856W
Model/Series:	A36	**Aircraft Category:**	Airplane
Year of Manufacture:	1973	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E-430
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 8, 2018 Annual	**Certified Max Gross Wt.:**	3651 lbs
Time Since Last Inspection:	37 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4671 Hrs at time of accident	**Engine Manufacturer:**	Continental Motors
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	IO-550B4F
Registered Owner:		**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Dawn
Observation Facility, Elevation:	KBRD,1221 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	09:53 Local	**Direction from Accident Site:**	340°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	280°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.14 inches Hg	**Temperature/Dew Point:**	23°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Poplar Grove, IL (C77)	**Type of Flight Plan Filed:**	IFR
Destination:	Brainerd, MN (BRD)	**Type of Clearance:**	VFR
Departure Time:	08:07 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	Brainerd Lakes Rgnl BRD	**Runway Surface Type:**	
Airport Elevation:	1232 ft msl	**Runway Surface Condition:**	Vegetation
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	46.382499,-94.119445(est)

Administrative Information

Investigator In Charge (IIC):	Folkerts, Michael
Additional Participating Persons:	Raymond Peterson; Flight Standards District Office; Minneapolis, MN Michael Council; Continental Aerospace Technologies; Mobile, AL Pete Basile; Textron Aviation; Wichita, KS Russell Layton; Tornado Alley Turbo Inc.; Ada, OK
Original Publish Date:	August 3, 2020
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97935