Aviation Investigation Final Report

Location:	Quincy, Florida	**Accident Number:**	ERA18LA229
Date & Time:	August 24, 2018, 12:35 Local	**Registration:**	N773CB
Aircraft:	Beech A36	**Aircraft Damage:**	Substantial
Defining Event:	Fuel related	**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot performed a preflight inspection of the airplane and engine run-up with no discrepancies. During the takeoff, about 125 ft above ground level with the landing gear extended, the pilot reported that the engine suddenly lost total power. The pilot did not have adequate time to troubleshoot the loss of power before performing a forced landing, during which the airplane impacted a tree. Although the pilot recalled departing with the fuel selector on the left tank position and he did not report changing it during the flight, it was found in the right tank position after the accident.

Examination of the airframe and engine fuel system components revealed minimal or no fuel in the fuel pumps and throttle body. This finding was supported by decreased fuel flow recorded by the engine monitor and was consistent with fuel starvation; however, the reason for the decreased fuel flow could not be determined. Examination of the fuel vent system for the left and right fuel tanks revealed that both were free of obstructions from one of the vents into each respective tank, and the fuel supply system from each wing fuel tank to the engine were also clear for either fuel selector position. Water found in the right fuel tank was consistent with the fire department using water to extinguish fires started during the recovery process. A test run of the engine revealed no anomalies that would have precluded normal operation.

The mixture lever at the metering valve was impact damaged and loose and exhibited evidence of smearing damage to a section of the brass lever; however, the smearing was not along the entire periphery. Therefore, there was no evidence that the mixture control lever was rotating in relation to the stem of the mixture control shaft.

Probable Cause and Findings

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

A loss of engine power due to decreased fuel flow for reasons that could not be determined based on the available evidence.

Findings

Aircraft	Fuel - Not specified
Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Initial climb	Fuel related (Defining event)
Maneuvering	Collision with terr/obj (non-CFIT)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On August 24, 2018, about 1235 eastern daylight time, a Beech A36, N773CB, was substantially damaged when it was involved in an accident near Quincy Municipal Airport (29J), Quincy, Florida. The private pilot was seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot stated that the purpose of the flight was to fly the airplane to Jefferson Landings Airport (74FL), Monticello, Florida for its annual inspection, which was overdue. He performed a walk-around inspection of the airplane using the checklist, and stated that "everything was good." The inspection included a check of each fuel tank for contaminants, none were found. After starting the engine, he performed a run-up, which included a check of the magnetos and cycling of the propeller, noting that the magneto checks produced "hardly any [rpm] drop at all."

The pilot further stated that he taxied a considerable distance to the runway with the auxiliary fuel pump off, indicating that the engine-driven fuel pump was operating satisfactorily. He initiated takeoff with the fuel selector positioned to what he recalled was the left tank. During the initial climb, the engine suddenly lost total power. The pilot did not recall if the propeller stopped. He immediately pitched to maintain airspeed and performed a forced landing, during which the airplane impacted a tree.

A witness noticed the accident airplane when it was halfway down runway 14 during the takeoff roll. He observed the airplane lift off and start to climb. When the airplane got above tree-top level, he noticed that the landing gear was still down, the nose pitched up slightly, and the airplane stopped climbing. The airplane continued to pitch up and began rolling to the left. The left bank and nose-high attitude continued as the airplane began losing altitude; he then lost sight of the airplane behind trees.

Another witness reported that he saw the airplane in the initial climb after takeoff at a very shallow angle, in a nose-high attitude, still at full power. The airplane then turned to the left while seeming to slow. The left wing was down at an approximate 40° to 45° angle. The airplane seemed like it was buffeting, but the engine was still at full power. He could see the entire roof, both wings and both horizontal stabilizers. The airplane then disappeared behind the trees, and he heard the impact.

Pilot Information

Certificate:	Private	**Age:**	78,Male
Airplane Rating(s):	Single-engine land	**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:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	July 1, 2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 2185.1 hours (Total, all aircraft), 2000 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N773CB
Model/Series:	A36 UNDESIGNAT	**Aircraft Category:**	Airplane
Year of Manufacture:	2001	**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	E-3376
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:	February 12, 2017 Annual	**Certified Max Gross Wt.:**	3650 lbs
Time Since Last Inspection:	59 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1570.9 Hrs as of last inspection	**Engine Manufacturer:**	Continental Motors
ELT:	C91A installed	**Engine Model/Series:**	IO-550-B
Registered Owner:		**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was originally equipped with a 300-horsepower Continental Motors, Inc., IO-550-B engine, which was modified in May 2002, in accordance with (IAW) supplemental type certificate (STC) SE5222NM by "turbonormalizing" and installing a turbocharger and associated equipment. It was also modified by installation of a constant-speed MT propeller IAW STC SA02535CH.

According to the Flight Manual Supplement (FMS) associated with the engine modification, the fuel flow range for takeoff was 32.0 to 35.0 gallons per hour (gph), and the FMS specified the fuel pump to be on the "lo" position during takeoff. A note indicated that if the fuel flow exceeded the red line limit, to manually lean to fuel flow red line prior to takeoff.

GPS data was correlated with data downloaded from the engine monitor, which recorded every 6

seconds. The fuel flow increased to 31 gph, consistent with application of takeoff power, then 6 seconds later, the fuel flow was 38 gph. The fuel flow dropped to 37 gph and remained at that value for 6 seconds, until the airplane was past the departure end of runway 14 at 332 ft GPS altitude (about 125 ft above runway elevation) and 80 knots groundspeed, the fuel flow was recorded as 12 gph. At that moment, the exhaust gas temperature, cylinder head temperature, and rpm readings peaked from the previous values. The fuel flow then increased to about 16 gph, decreased to about 10 gph, then increased to about 14 gph. During that time, to the end of the GPS-recorded data, the airplane continued climbing, attaining a maximum GPS altitude of 347 ft and slowed to 64 knots groundspeed. The accident site was located about 630 ft east of the last GPS data point.

The pilot stated that the airplane was last refueled at 2J9 either in April or May 2018. He reported that the wings and tip tanks were filled at that time, but he may have flown the airplane on a short trip after fueling, which would have resulted in between 80 and 100 gallons of fuel onboard at the time of takeoff.

According to data downloaded from the GPS, the last two flights were on April 14th, and April 15th, 2018.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	2J9,225 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	12:53 Local	**Direction from Accident Site:**	302°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 3600 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	Unknown / Unknown
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	31°C / 23°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Quincy, FL (2J9)	**Type of Flight Plan Filed:**	None
Destination:	Monticello, FL (74FL)	**Type of Clearance:**	None
Departure Time:	12:34 Local	**Type of Airspace:**	

Airport Information

Airport:	Quincy Municipal Airport 2J9	**Runway Surface Type:**	Asphalt
Airport Elevation:	225 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:	14	**IFR Approach:**	None
Runway Length/Width:	2964 ft / 75 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	30.593055,-84.548614

The airplane came to rest inverted adjacent to trees in the front yard of a residence, about 1/4 mile east-southeast of 2J9. Recovery personnel reported that the left fuel tank was intact and contained an estimated 20 to 25 gallons of fuel, while the right fuel tank was breached. The Federal Aviation Administration (FAA) inspector who examined the wreckage at the accident site took a photograph of the cockpit, which depicted the fuel selector positioned to the right main fuel tank. He also reported that fires were started when the recovery crew attempted to cut the right wing off, which the fire department extinguished. The fire department then used battery-powered tools to cut the wings off due to the fuel at the scene.

Examination of the airplane following recovery revealed the landing gear was extended and the flaps were retracted.

Four ounces of light purple-colored liquid was drained from the right wing fuel tank sump drain. The sample did not smell of fuel, and was tested using water finding paste, which detected water. Only drops of blue-colored liquid consistent with 100 low lead aviation fuel were drained from the fuel strainer. Both wing fuel tank strainer screens were free of obstructions, though the left was crushed/deformed. The fuel strainer screen was removed, and the screen element was clean, but the "cone" portion contained trapped debris. No obstructions were noted from each wing root through the fuel selector valve, auxiliary fuel pump, to the engine-driven fuel pump inlet for the left and right fuel selector positions. No fuel was noted in the inlet or outlet lines at the auxiliary fuel pump, nor at the flexible fuel hoses at the engine-driven fuel pump. The engine-driven fuel pump was removed from the engine and the drive coupling was intact. The fuel pump operated smoothly when rotated manually and no fuel was expelled. The throttle body fuel screen was removed and inspected. No contamination was discovered and only a very small drop of fuel was expelled when the fuel screen was removed.

Examination of the left wing fuel vent system revealed the inboard scoop assembly and extended vents were not located or observed. No obstructions were noted from the outer flange vent into the tank or to the wing root area where the vent line was crushed. The check valve was installed in the proper orientation and was free of obstructions.

Examination of the right wing fuel vent system revealed tan-colored debris completely blocked the opening of the inboard scoop assembly vent. Following removal of the debris, the line was blocked at an unknown location along its length. The inboard extended vent was free of obstructions from the opening

to where the vent line was cut for recovery at wing station 71. The outer flange-vent was clear from the lower wing surface to the aluminum line that was fractured. The check valve that was recovered was matched with the fractured aluminum line and was installed in the correct orientation. The "T-fitting" that would have been installed inboard of the check valve was not located. No obstructions were noted from the remainder of the vent line into the fuel tank. The vent line inboard of the fuel tank was fragmented, and/or could not be accessed.

During the initial examination of the engine, the left magneto did not produce a spark at any ignition lead, and the timing to the engine could not be determined. The engine with turbocharger system components were removed from the airframe and shipped to the manufacturer's facility where impact damaged components of the engine were replaced and it was fitted with a test club propeller. In preparation for an engine run the contact points of the left magneto were cleaned with emery paper, and it was placed on a test bench and found to operate normally. The engine was placed in a test cell and during the first attempted run achieved a maximum of 2,250 rpm. During that run, fuel leakage was noted from the impact-damaged mixture shaft of the metered fuel assembly and impact damage to ignition leads resulted in the No. 6 cylinder not firing. The ignition leads were temporarily repaired, and the engine was started and operated to 2,620 rpm, but because it was not possible to lower cooling shrouds, it was normal to have a decrease from maximum engine rpm.

The metered fuel assembly with lever and securing nut were sent to the NTSB Materials Laboratory for examination. According to the factual report, the control lever exhibited plastic deformation, and indentations from the stem's splines were noted on the side of the hole nearest the lever's "dog leg." On the lever opposite the lever's "dog leg" was a smeared contact pattern without distinguishable indentations from the stem's splines; the smeared contact pattern did not extend along the entire periphery of the through hole.

Additional Information

NTSB was provided two videos that depicted a portion of the accident flight. The airplane first came into view on the right side of the screen in a near wings-level, slight nose-up attitude. The video depicted the airplane banking to the left and descending while in a left-wing-low attitude.

Correlation of onboard data with the video revealed that the left turn began at 1234:32, while the airplane was about 332 ft gps altitude and 80 knots groundspeed, about the time the fuel flow was recorded as 12 gph.

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Timothy S Annis; FAA/FSDO; Tampa, FL Jennifer D Barclay; Textron Aviation, Inc; Wichita, KS Mike Council; Continental Aerospace Technologies; Mobile, AL
Original Publish Date:	May 27, 2021 **Investigation Class:** 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98150