Aviation Investigation Final Report

Location:	Chesterfield, Missouri	**Accident Number:**	CEN18FA049
Date & Time:	December 6, 2017, 14:54 Local	**Registration:**	N679EA
Aircraft:	RAYTHEON AIRCRAFT COMPANY B36TC	**Aircraft Damage:**	Destroyed
Defining Event:	Fuel starvation	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was nearing the destination airport at the conclusion of an approximate 1,100 nautical mile cross-country flight; the accident occurred about 5 hours 26 minutes after takeoff. During the visual approach for landing, the pilot performed a constant left turn for about 3 minutes from the downwind leg to the final leg of the traffic pattern. About the time the pilot rolled out of the left turn and onto the final approach leg, he reported to the tower controller that he had an issue and was losing engine power. The airplane subsequently impacted a gas station pump canopy and parking lot about 1 mile from the end of the runway, where it was destroyed during a post-impact fire. Several witnesses near the accident location observed the airplane at a low altitude with the wings rocking back and forth, and they heard no engine noise.

A postaccident examination of the airframe and a functional engine test revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

The fuel selector was found on the left tank position. The total fuel quantity of fuel on board the airplane at takeoff and the quantity remaining in each fuel tank at the accident site could not be determined; however, the airplane would likely have been low on fuel as it neared the departure airport. It is likely that the pilot's extended left turn from downwind to final approach moved fuel away from the fuel tank pick up point, which resulted in fuel starvation and a total loss of engine power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper fuel management, which resulted in a total loss of engine power due to fuel starvation.

Findings

Personnel issues	Use of equip/system - Pilot
Aircraft	Fuel - Fluid management
Aircraft	Fuel - Fluid level

Factual Information

History of Flight

Approach-VFR pattern final	Fuel starvation (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

On December 6, 2017, at 1454 central standard time (CST), a Raytheon Aircraft Company B36TC airplane, N679EA, was destroyed when it impacted a gas station pump canopy and parking lot while on visual approach to Spirit of St. Louis Airport (SUS), Chesterfield, Missouri. The private pilot sustained fatal injuries. The airplane was registered to Wings West, LLC, Las Vegas, Nevada, and was being operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Day visual meteorological conditions prevailed at the time of the accident, and the flight was operated on an instrument flight rules (IFR) flight plan. The flight departed the Phoenix Deer Valley Airport (DVT), Phoenix, Arizona, at 0926 CST and was destined for SUS.

The morning before the accident flight, the airplane was "topped off" with 72 gallons of fuel and the oxygen system was serviced by fixed base operator line personnel. The amount of fuel onboard before the fueling could not be determined. Line personnel reported that, after servicing the airplane, the fuel level was about 1-1 1/2 inches below the fuel "flappers" in each wing fuel tank. Personnel spoke to the pilot before his departure and observed a portion of his preflight inspection, but they did not notice if the pilot visually checked the wing fuel tank levels.

According to air traffic control (ATC) radar data and communications, the pilot contacted the Albuquerque Air Route Traffic Control Center about 1220 to obtain an IFR clearance. The pilot was then cleared from 17,500 ft mean sea level (msl) to flight level (FL) 230, and at 1234, the airplane leveled off at FL 230. At 1244, the pilot requested and was approved for a descent from FL 230 to FL 210 to control engine temperatures.

At 1422, the pilot asked ATC for a pilot's discretion descent to 8,000 ft. From 1438 to 1450, the pilot was cleared for several step descents from 9,000 ft to 3,000 ft as the airplane neared SUS.

At 1450, the pilot was cleared for a left traffic visual approach to runway 26L. Radar data showed the airplane in a constant left turn for about 3 minutes from the downwind leg to the final leg of the traffic pattern. At 1454:00, about 260 ft above ground level near the end of the left turn onto final, the pilot reported to ATC that he had an issue and was losing power. The controller immediately cleared the pilot to land on runway 26L, and at 1454:09, the pilot responded that he may not be able to make it to the airport. Radar data showed the airplane turned right toward a nearby road. The airplane subsequently impacted a gas station pump canopy about 1 mile from the end of runway 26L. No further communications were received from the pilot.

Several witnesses near the accident site observed the airplane at a low altitude with the wings rocking back and forth, and they heard no engine noise. Shortly thereafter, the airplane impacted the top of the gas station pump canopy and the gas station parking lot, and a post-impact fire ensued. Witnesses

attempted to suppress the fire with available fire extinguishers; however, their attempts to suppress the fire were unsuccessful due to reported intense heat and smoke.

Pilot Information

Certificate:	Private	**Age:**	72,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	August 30, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 4620 hours (Total, all aircraft)		

The pilot's logbook was not located during the investigation. On his most recent Federal Aviation Administration (FAA) airman medical examination application, dated August 30, 2016, the pilot reported 4,620 total hours of flight experience and 50 hours in the previous 6 months.

According to the pilot's family, he had completed this flight route, DVT to SUS, in the accident airplane several times since purchasing the airplane in February 2017.

Aircraft and Owner/Operator Information

Aircraft Make:	RAYTHEON AIRCRAFT COMPANY	**Registration:**	N679EA
Model/Series:	B36TC	**Aircraft Category:**	Airplane
Year of Manufacture:	2001	**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	EA-679
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	June 3, 2017 Annual	**Certified Max Gross Wt.:**	3850 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	722.1 Hrs as of last inspection	**Engine Manufacturer:**	TCM
ELT:	C91 installed, activated, did not aid in locating accident	**Engine Model/Series:**	TSIO-520-UB
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was registered to Wings West, LLC, on February 7, 2017.

According to the Pilot Operating Handbook (POH), the fuel system of the airplane consisted of two interconnected bladder-type fuel cells located in each wing leading edge. Each wing contained a total of 54 gallons with a usable supply of 51 gallons. Each wing had a flush-type filler cap covering an anti-siphon valve. The fuel tank was full when the fuel level reached the spring-loaded door of the anti-siphon valve. In addition, each wing tank was equipped with a fuel quantity sight gauge. Fuel quantity was measured by float-operated fuel level sensors located in each wing tank, which transmit electrical signals to the cockpit fuel quantity gauges, and indicate usable fuel remaining in each tank. The fuel selector valve handle was located forward and to the left of the pilot's seat; the POH stated that takeoffs and landings must be made using the tank that is nearest full.

The POH stated that it was the pilot's responsibility to ascertain that the fuel quantity indicators are functioning and maintaining a reasonable degree of accuracy and to be certain of ample fuel for a flight.

The airplane was equipped with a cabin door on the right side of the fuselage, utility doors located on the aft right side of the cabin, and two openable cabin windows located aft of the two forward seats.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SUS,463 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	14:54 Local	**Direction from Accident Site:**	80°
Lowest Cloud Condition:	Few / 6500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	280°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	9°C / -4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Phoenix, AZ (DVT)	**Type of Flight Plan Filed:**	IFR
Destination:	St. Louis, MO (SUS)	**Type of Clearance:**	IFR
Departure Time:	08:26 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Spirit of St. Louis Airport SUS	**Runway Surface Type:**	Concrete
Airport Elevation:	463 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	26L	**IFR Approach:**	None
Runway Length/Width:	7485 ft / 150 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	38.400001,-90.370002

The airplane came to rest upright on a 330° heading on the edge of the parking lot surface and the grass ditch between the gas station and adjacent roadway. A post-impact fire consumed the fuselage and inboard sections of both wings. The left wing sustained impact damage and was partially separated near the wing root. The right main landing gear tire and strut were separated and came to rest in the intersection of two roads about 190 ft from the airplane. The forward cabin door, located on the right side and partially attached to the airplane, came to rest against a light pole. The light pole location relative to the door, restricted the door from fully opening after the accident. The door was found in a partially opened position.

The left wing was fragmented and displayed thermal damage. The left aileron was separated, and the flap was bent and thermally damaged. The left fuel tank was destroyed. The right wing remained partially attached to the fuselage and displayed thermal damage near the wing root. The aileron and flap remained attached to the wing. The right wing was bent downward, the fuel caps were intact and seated in place, and no fuel was noted in the fuel tank. During recovery of the accident airplane, residual fuel was observed to be leaking near the inboard wing root. The empennage remained attached to the airframe and thermal damage was noted near the aft cabin bulkhead. The rudder and elevator remained attached to their respective stabilizers.

The cockpit, instrument panel, and aft cabin were destroyed by fire. The throttle lever was found in the aft position, and the mixture and propeller control levers were found in the full forward position. Flight control continuity was established from the cockpit to all flight control surfaces. The landing gear was found in the extended position, and the wing flaps were in the retracted position. The fuel selector valve was found in the left fuel tank position and the valve moved freely when rotated by hand.

The engine remained attached to the engine mount and firewall and was bent down relative to the airframe. The engine fuel lines were found secured. Residual fuel was noted in the fuel manifold valve. The three-blade propeller remained attached to the engine. One blade was straight with minor damage, one blade tip was bent aft, and one blade was twisted and curled.

On February 14-15, 2018, the engine was visually examined and placed in a test cell at the manufacturer's facility under the supervision of an NTSB investigator. Visual examination showed minor thermal damage to the accessory section and residue from fire extinguishing efforts. The induction and exhaust systems exhibited minor impact damage. The turbocharger remained attached to the engine and the turbocharger turbine wheel was seized. The turbocharger was removed and replaced with a slave turbocharger for the engine functional test.

Disassembly of the turbocharger showed impact damage to the housing that prevented the turbine wheel from rotating.

During the engine test run, the engine started without hesitation or stumbling. During the 35-minute test, the engine accelerated smoothly, and ran continuously without interruption at all power settings and throttle changes with no anomalies noted.

Although the examination was limited due to thermal and impact damage, no pre-impact anomalies were noted with the airframe or engine.

Flight recorders

The airplane was equipped with a J.P. Instruments (JPI) EDM-730/830 engine data monitor which was a panel mounted liquid crystal display unit that the operator can monitor and record up to 24 engine parameters. The unit contained non-volatile memory for data storage of the parameters recorded and calculated. The JPI unit was recovered from the accident airplane and forwarded to the NTSB Vehicle Recorders Division, Washington, DC, for examination and data extraction. Data for the accident flight and several previous flights showed evidence of corruption, and the data could not be validated.

Medical and Pathological Information

The St. Louis County, Office of the Medical Examiner, St. Louis, Missouri, conducted an autopsy of the pilot. The autopsy listed thermal injury and inhalation of carbon monoxide smoke as the cause of death.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing of the pilot. Testing revealed 18% carboxyhemoglobin in the blood, 3.646 (ug/mL) cyanide in the blood, and unspecified levels of propranolol in the blood and urine.

The elevated levels of carboxyhemoglobin and cyanide are the products of combustion and were consistent with the reported cause of death and autopsy findings.

The pilot had previously reported the use of propranolol on his airman medical certificate application. Propranolol is a prescription medication used to treat high blood pressure, abnormal heart rhythms, heart disease, and/or certain types of tremors. It is also used to prevent angina (chest pain) and migraine headaches. It does not cause impairment.

After the accident, the pilot was located laying in the forward/cockpit seats of the airplane.

Additional Information

The radar and winds aloft data were used to estimate the average airspeed of the airplane during the cruise portion of the flight. Based on the data, the airplane's average cruise airspeed was about 150 knots throughout the flight. The total duration of the accident flight was 5 hours 26 minutes, and the total distance travelled was 1103 nautical miles. Due to a lack of data from the engine monitor, the power settings or leaning procedures used during any portion of the flight could not be determined. Estimated fuel consumption calculations ranged from about 66 gallons to 98 gallons.

According to the POH, Section 3 Emergency Procedures, Emergency Exits, the openable windows on the left and right side of the cabin may be used for emergency egress in addition to the cabin door and utility doors. An emergency exit instructions placard was located on each emergency exit latch cover.

Administrative Information

Investigator In Charge (IIC):	Sauer, Aaron
Additional Participating Persons:	Travis Schwien; Federal Aviation Administration; St. Louis, MO Henry Soderlund; Textron Aviation; Wichita, KS Chris Lang; Continental Motors Inc; Mobile, AL
Original Publish Date:	November 6, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96433

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