Aviation Investigation Final Report

Location:	Bakersfield, California	**Accident Number:**	WPR17LA059
Date & Time:	January 31, 2017, 16:40 Local	**Registration:**	N711YK
Aircraft:	Beech E 55	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The commercial pilot reported that, following an uneventful flight to break in the recently installed rebuilt left engine, he entered the airport traffic pattern. As the airplane crossed over the runway threshold, he reduced power, and the airplane began to settle into ground effect. Subsequently, the pilot initiated a go-around. When he applied power, the right engine responded; however, the left engine did not respond, and the airplane immediately began rolling and yawing left. The pilot reduced power and applied control inputs, but the airplane continued to yaw left and then impacted terrain.

Photographs obtained from airport management showed that, immediately following the accident, the left auxiliary fuel pump switch was in the "low" position. Both engines were test run in an engine test cell, and they started and operated normally at various power settings. The left auxiliary fuel pump was operationally tested and compared to the limits noted on the manufacturer's data plate. During functional tests in the low-boost setting, the fuel flow rate was almost double the minimum specification for the low-boost setting and higher than the minimum high-boost fuel flow rate. Leaking fluid was observed around the outlet fitting, so the outlet fitting was removed; an O-ring was found damaged, which likely resulted in fuel leaking around the outlet fitting. The investigation could not determine how or when the O-ring was damaged. A new O-ring was installed, and functional tests were conducted again. In the low-boost setting, the fuel flow rate was again more than double the minimum specification for the low-boost setting and higher than the minimum high-boost fuel flow rate. During a review of airframe and engine maintenance records, no entries were found pertaining to the left auxiliary fuel pump.

The Pilot's Operating Handbook specified that, before takeoff or landing, the auxiliary fuel pumps should be off unless the ambient temperature is 90°F or above, in which case they should be set at "low." The ambient temperature at the time of the accident was 64°F. Therefore, it is likely that, during the attempted go-around, the left auxiliary fuel pump was positioned to "low" and that this, in combination with the excessive fuel flow rate while positioned to the low-boost setting, resulted in the 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 failure to select the proper fuel boost pump setting for the left auxiliary fuel pump, which allowed for an excessive fuel flow to the left engine, which resulted in a total loss of engine power and airplane control during an attempted go-around.

Findings

Personnel issues	Use of equip/system - Pilot
Aircraft	Fuel pumps - Incorrect use/operation
Aircraft	Fuel distribution - Capability exceeded

Factual Information

History of Flight

Approach-VFR go-around	Loss of engine power (total)
Approach-VFR go-around	Loss of control in flight (Defining event)
Approach-VFR go-around	Collision with terr/obj (non-CFIT)

On January 31, 2017, about 1640 Pacific standard time, a Beech E-55 airplane, N711YK, was substantially damaged when it impacted terrain during an attempted go-around at the Meadows Field Airport (BFL), Bakersfield, California. The commercial pilot sustained minor injuries. The airplane was registered to Sanbarcollbuscom Inc. and operated by the California Aeronautical University as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight which originated from BFL about 1530.

The pilot reported that the purpose of the flight was to break in the recently installed rebuilt left engine, which was being done at a full power setting. Following the uneventful flight, he entered the airport traffic pattern on an extended final for runway 30R. As the airplane crossed over the runway threshold and the pilot reduced power, the airplane began to settle into ground effect. The pilot stated that he thought the airplane settled lower than normal and that he decided to initiate a go-around to troubleshoot the landing gear. Upon the application of power, the right engine responded, however, when the left engine did not respond the airplane immediately rolled to the left. Despite reducing power and applying control inputs, the airplane continued to yaw to the left and impacted terrain.

Examination of the airplane by a Federal Aviation Administration inspector revealed that both wings and the fuselage were substantially damaged. The wreckage was recovered to a secure location for further examination.

Examination of the recovered wreckage revealed that the left and right engines were separated from the wings and both wings were separated from the fuselage. Examination of the airframe revealed that both the left and right auxiliary fuel boost pumps were in the "off" position. However, photos provided by airport management shortly after the accident showed the left fuel boost pump in the LOW position and the right fuel boost pump in a position consistent with OFF. The left auxiliary fuel pump was retained for further examination. Both the left and right engines were shipped to the facilities of Continental Motors Inc., Mobile, Alabama, for further examination.

The left engine, a Continental IO-520-CB (8), was mostly intact. The starter and vacuum pump were separated from their mounts. Impact damage was observed to the wye adapter, and both induction elbows. Impact damage was observed to the exhaust. The engine was installed in an engine test cell. A normal start on the first attempt was obtained without hesitation or stumbling in observed RPM. The engine was run at various power settings for 20 minutes with no fluctuations in engine RPM. The engine throttle was rapidly advanced from idle to full throttle five times where it performed normally without any hesitation, stumbling or interruption in power. The engine was shut down normally by moving the mixture to idle cut off.

The right engine, a Continental IO-520-C was mostly intact. The starter was separated. The left magneto rotated freely by hand amongst its attach point. Both securing nuts were found loose and not torqued. Without adjusting the magneto, the engine was installed in an engine test cell. A normal start on the first attempt was obtained without hesitation or stumbling in observed RPM. The engine was run at various power settings for 20 minutes with no fluctuations in engine RPM. The engine throttle was rapidly advanced from idle to full throttle five times where it performed normally without any hesitation, stumbling or interruption in power. The engine was shut down normally by moving the mixture to idle cut off.

No mechanical anomalies were revealed that would have precluded normal operation of either engine. For further information regarding the engine runs, see the attached engine run reports within the public docket for this accident.

The left airframe auxiliary fuel boost pump was removed and subsequently shipped to CJ Aviation, Miami, Florida, for further testing. On April 10, 2019, the fuel pump was examined under the supervision of an NTSB investigator. The fuel pump was placed on a test bench, and operationally tested to the limits noted on the manufacturers data plate, which noted flow rates for low boost, at 5 psi, a minimum of 20 gallons per hour (gph) and high boost, at 21 psi, a minimum of 35 gph. During initial tests in the high boost setting, fluid was observed leaking from the outlet fitting. At a pressure of 21 psi, the unit flowed 27.7 gph. The pump was placed in the low boost setting, liquid remained leaking from the outlet fitting. At a pressure of 5 psi, the unit flowed 43.2. gph. The outlet fitting was removed, and the O-ring was found damaged. A new O-ring was installed, and the fuel pump was tested in low and high settings again. The high boost setting at a pressure of 21 psi produced a fuel flow rate of 39 gph, and the low boost setting, at a pressure of 5 psi, produced a flow rate of 45.1 gph. For further information, see the auxiliary fuel pump examination report within the public docket for this accident.

The pilot operating handbook for the accident airplane outlines in Section IV, Normal Procedures,

Before Takeoff, the auxiliary fuel pumps shall be in the OFF position (if ambient temperature is 90^{O}F of above, use LOW pressure boost). For the Before Landing Checklist, the fuel boost pumps shall be in the OFF position or LOW as per ambient temperature. The manual further states in Section VIII, System Descriptions, "…In high ambient temperatures, low pressure should be used for ground operation, take-off, and climb" in addition to "…the high pressure position should not be selected while the engine is operating except in the event of engine driven pump failure, since the high pressure mostly supplies a greater pressure than can be accepted by the injector system for a reduced power condition."

Review of supplied airframe and engine maintenance records did not contain any entries pertaining to the airframe fuel pump.

The reported temperature at BFL about 14 minutes after the accident was 64°F.

Pilot Information

Certificate:	Commercial	**Age:**	71,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	June 25, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 1, 2017
Flight Time:	8056 hours (Total, all aircraft), 1581 hours (Total, this make and model), 8056 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N711YK
Model/Series:	E 55 UNDESIGNAT	**Aircraft Category:**	Airplane
Year of Manufacture:	1973	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	TE-922
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:	March 1, 2016 Annual	**Certified Max Gross Wt.:**	5302 lbs
Time Since Last Inspection:		**Engines:**	Reciprocating
Airframe Total Time:	8012.6 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-520-CB
Registered Owner:	Sanbarcollbuscom	**Rated Power:**	285 Horsepower
Operator:	California Aeronautical University	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KBFL,492 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	00:54 Local	**Direction from Accident Site:**	17°
Lowest Cloud Condition:	Clear	**Visibility**	5 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.05 inches Hg	**Temperature/Dew Point:**	18°C / 7°C
Precipitation and Obscuration:	N/A - None - Haze		
Departure Point:	Bakersfield, CA (BFL)	**Type of Flight Plan Filed:**	None
Destination:	Bakersfield, CA (BFL)	**Type of Clearance:**	None
Departure Time:	15:30 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	MEADOWS FIELD BFL	**Runway Surface Type:**	Asphalt
Airport Elevation:	509 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	30R	**IFR Approach:**	None
Runway Length/Width:	10849 ft / 150 ft	**VFR Approach/Landing:**	Straight-in

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	35.431388,-119.055(est)

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Troy Wise; Federal Aviation Administration; Fresno, CA Mike Council; Continental Motors Inc.; Mobile, AL
Original Publish Date:	May 28, 2020
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=94681