Aviation Investigation Final Report

Location:	Broken Bow, Nebraska	**Accident Number:**	CEN12FA210
Date & Time:	March 28, 2012, 13:13 Local	**Registration:**	N1567W
Aircraft:	Beech E-55	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot said that he noted an imbalance between the left and right main fuel tanks during cruise flight. He attempted to correct the imbalance by placing the left fuel selector in the crossfeed position so that both engines would receive fuel from the right main fuel tank. About 15 minutes after the pilot selected the crossfeed position, both engines lost power. When the pilot reset the left and right fuel selectors to the left main and the right auxiliary fuel tanks, respectively, the left engine regained power and the right engine began "surging." The pilot decided not to shut down the right engine and diverted to the nearest suitable airport. During final approach, the right engine lost power completely, and the airspeed decayed until it approached the airplane's minimum control airspeed. When the airplane drifted right of the runway centerline, the pilot reduced power on the left engine in an attempt to maintain control. The airplane impacted an open field near the runway and a postimpact fire ensued.

Postaccident examination revealed no airframe or engine anomalies consistent with a preimpact mechanical failure or malfunction. Both fuel selectors were positioned to their respective main fuel tanks. The pilot stated that the airplane was fully fueled before departure. The airplane fuel system was composed of two 37-gallon main fuel tanks and two 31-gallon auxiliary fuel tanks. The pilot stated that he had not used any of the fuel in the auxiliary tanks before the loss of engine power. The pilot's operating handbook noted that the crossfeed system was not to be used to transfer fuel from one tank to another or to balance fuel during flight. The simultaneous loss of engine power while both engines were receiving fuel from one fuel tank, the restoration of power on the left engine after switching fuel tanks, operation at or near the fuel endurance limit for the right main fuel tank, and the lack of anomalies identified during the engine exams are consistent with exhaustion of fuel in the right main tank.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot’s failure to maintain airspeed and subsequent loss of airplane control during a single-engine landing approach. Contributing to the accident was the pilot's improper fuel management during cruise flight, which resulted in an initial loss of power in both engines and the subsequent single-engine approach after power was restored on only one engine.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Personnel issues	Incorrect action selection - Pilot
Aircraft	Fuel - Fluid management

Factual Information

History of Flight

Enroute-cruise	Fuel starvation
Enroute-cruise	Loss of engine power (total)
Emergency descent	Off-field or emergency landing
Approach-VFR pattern final	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On March 28, 2012, about 1313 central daylight time, a Beech E-55 (Baron), N1567W, was substantially damaged when it impacted terrain while on approach to the Broken Bow Municipal Airport (BBW), Broken Bow, Nebraska. The pilot was seriously injured and the sole passenger was fatally injured. The aircraft was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which was not operated on a flight plan. The flight originated from Dickinson – Theodore Roosevelt Regional Airport (DIK) at 1053. The intended destination was Russell Municipal Airport (RSL), Russell, Kansas.

After takeoff, the flight climbed to 11,500 feet mean sea level (msl) en route to RSL. The pilot obtained visual flight rules flight following services from Denver Air Route Traffic Control Center. At 1303, the pilot informed the Denver Center controller of an engine failure. At that time, the flight was about 20 miles west-northwest of BBW. The pilot altered course and diverted to BBW. The final radar data point, recorded at 1313:41 (hhmm:ss), was located 1.53 miles northwest of BBW, with an associated altitude of 3,400 feet msl.

The pilot stated that during cruise flight the left main fuel tank indicated a lower quantity than the right main fuel tank. In an effort to balance the fuel levels, he elected to set the left fuel selector to crossfeed. About 15 minutes after switching tanks, the right engine lost power, followed shortly by the left engine. Power was restored to the left engine about 10 seconds after resetting the fuel selector to the left main tank. The pilot reportedly set the right fuel selector to the right auxiliary tank after the loss of power. The right engine was "surging," so he did not shut it down. The pilot reported that he was unable to maintain altitude with the left engine at full power.

After establishing visual contact with BBW, the pilot lowered the landing gear and selected approach flaps in preparation for landing. Full rudder input was required to maintain directional control. The right engine lost power completely when the airplane was on a 1-1/2 mile final; about 900 feet agl. The pilot did not feather the right propeller, thinking he was too close to landing to get the engine secured. The airspeed was approaching minimum control airspeed at

that time. The pilot reported that the airplane drifted about 100 yards west (right) of the runway centerline and he reduced power on the left engine in an attempt to maintain control. The airplane impacted an open field about 455 feet west-southwest of the BBW runway 14 threshold. The airplane came to rest inverted about 120 feet southwest of the initial impact point. A postimpact fire ensued.

PERSONNEL INFORMATION

The accident pilot held a private pilot certificate with single and multi-engine land airplane, and instrument airplane ratings. He was issued a third class airman medical certificate on June 4, 2009, with no limitations.

The pilot passed the practical test for the addition of a multi-engine land airplane rating to his private pilot certificate on March 22, 2012; 6 days prior to the accident. On his application for that rating, the pilot reported a total flight time of 257 hours, with 15.3 hours in Beech E-55 airplanes. He had reportedly accumulated an additional 7 hours in the Beech E-55 prior to the accident flight. His flight time within the previous 90 days was about 34 hours.

The pilot stated that his logbook was in the airplane at the time of the accident. (The logbook was not recovered during the on-scene examination and was presumably destroyed.)

AIRCRAFT INFORMATION

The accident airplane was a Beech E-55 Baron, serial number TE-862. It was a six-place, twin-engine airplane, configured with a retractable, tri-cycle landing gear. The airplane was powered by two 285-horsepower Continental IO-520-CB engines, serial numbers 282491-R (left) and 244387-R (right).

The most recent annual inspection was completed on September 15, 2011, at a total airframe time of 3,691 hours. The left and right engines had accumulated 768 and 1,020 hours, respectively, since a factory remanufacture.

Records indicated that the accident pilot purchased the airplane on January 12, 2012. The pilot stated that the airplane maintenance logbooks were in the airplane at the time of the accident. As a result, a detailed review of the airplane maintenance history was not possible. (The logbooks were not recovered during the on-scene examination and are presumably destroyed.)

METEOROLOGICAL INFORMATION

Weather conditions recorded by the BBW Automated Surface Observing System (ASOS), at 1253, were: Wind from 150 degrees at 13 knots, gusting to 20 knots; 10 miles visibility; clear sky; temperature 20 degrees Celsius; dew point 2 degrees Celsius; and altimeter 29.98 inches of mercury.

At 1353, weather conditions were: Wind from 150 degrees at 11 knots, gusting to 21 knots; 10 miles visibility; clear sky; temperature 22 degrees Celsius; dew point 2 degrees Celsius; and altimeter 29.96 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted an open field about 455 feet west-southwest of the runway 14 threshold at BBW. The wreckage path was about 170 feet long and was oriented on a bearing of about 210 degrees magnetic. The initial impact ground scar was 7 feet long by 2 feet wide by 1 foot deep. A second ground scar was located approximately 4 feet from the initial scar and measured approximately 33 feet long, up to 3 feet wide and 2 feet deep. Two additional ground scars were located along the debris path prior to the main wreckage.

Two areas of scorched terrain were observed at the accident site. The first was approximately 60 feet long by 25 feet wide, and located between the final ground scar and the main wreckage. The main wreckage consisted of the fuselage, empennage, and left engine. The second scorched area extended about 26 feet west of the main wreckage; adjacent to the right wing and fuselage nose. The second scorched area was about 12 feet wide.

The airframe came to rest inverted, bearing about 360 degrees. The empennage was separated and located adjacent to the fuselage; although, it was rotated about 150 degrees clockwise. The empennage was oriented vertically, with the rudder and elevators contacting the ground. Significant portions of the airframe were consumed by the postimpact fire. The outboard 3 feet of the right wing was separated from the remainder of the wing structure. It came to rest about 63 feet southeast of the initial impact ground scar. The wing tip did not exhibit any damage due to the postimpact fire. Both of the main landing gear assemblies were in the extended positions. The nose structure surrounding the nose landing gear was consumed by the postimpact fire. The position of the landing gear motor and actuator linkage corresponded to the extended gear positions.

The left engine was separated from the airframe and located about 2 feet from the engine pylon (firewall). The right engine was separated completely from the airframe. It came to rest about 46 feet southeast of the main wreckage. The left engine was discolored consistent with exposure to the postimpact fire. The right engine did not appear to exhibit any damage due to the postimpact fire. Both propeller assemblies remained attached to the engines. Damage to the individual propeller blades appeared consistent with impact forces and postimpact thermal exposure.

The flight control surfaces were intact and remained attached to the airframe, with the exception of the left aileron. Portions of the left aileron were consumed by the postimpact fire. Flight control cable continuity was confirmed. The flap flexdrive cables were continuous from the flap motor to both actuators. The left flap actuator extension was consistent with a 30-degree (full down) flap deflection. The right flap actuator was damaged to an extent that the right flap position could not be verified.

Both engine fuel selector valves sustained thermal damage consistent with the postimpact fire. No anomalies consistent with a failure of either valve assembly were observed. Both valve assemblies were positioned to their respective main fuel tanks at the time of the postaccident examination.

Partial teardown examination of the left engine did not reveal any preimpact anomalies. An operational test run was conducted on the right engine under direct supervision of the NTSB. The right engine operated smoothly throughout the full throttle range during the operational test run. The postaccident examinations of the airframe and engines did not reveal any anomalies consistent with a preimpact failure or malfunction.

ADDITIONAL INFORMATION

The pilot stated that the airplane was fully fueled (topped off) prior to departing DIK. Fixed base operator (FBO) records indicated that the accident pilot purchased 72.9 gallons of fuel at DIK the day prior to the accident flight.

The accident airplane had a maximum usable fuel capacity of 136 gallons distributed in four fuel tanks. It was equipped with a 37-gallon (usable) main fuel tank and a 31-gallon (usable) auxiliary fuel tank in each wing. Fuel quantity was indicated for either the main fuel tanks or the auxiliary fuel tanks in the respective wings. A two-position selector switch determined the tanks, either main or auxiliary, to which the indication is associated.

During normal operations, each engine draws fuel from the respective main or auxiliary fuel tank. However, the left and right fuel tanks are interconnected by crossfeed fuel lines. Crossfeed operation would allow the entire fuel supply of any fuel tank to be consumed by either engine. For example, with the left fuel selector in the crossfeed position, the left engine will draw fuel from the right main or auxiliary fuel tank, as set by the right fuel selector. The pilot's operating handbook noted that the crossfeed system was not to be used to transfer fuel from one tank to another or to balance fuel during flight.

An estimate of fuel consumption for the entire accident flight calculated that about 34.3 gallons of fuel was consumed from the right main fuel tank. About 30.0 gallons were consumed from the left main fuel tank. The pilot stated that he had not burned fuel from either auxiliary fuel tank prior to the loss of engine power.

Pilot Information

Certificate:	Private	**Age:**	33,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	June 4, 2009
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 22, 2012
Flight Time:	257 hours (Total, all aircraft), 23 hours (Total, this make and model), 34 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N1567W
Model/Series:	E-55	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	TE-862
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	September 15, 2011 Annual	**Certified Max Gross Wt.:**	5300 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	3691 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed	**Engine Model/Series:**	IO-520-CB
Registered Owner:	On file	**Rated Power:**	285 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	BBW,2547 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	12:53 Local	**Direction from Accident Site:**	230°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots / 20 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	20°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Dickinson, ND (DIK)	**Type of Flight Plan Filed:**	VFR
Destination:	Russell, KS (RSL)	**Type of Clearance:**	VFR flight following
Departure Time:	10:53 Local	**Type of Airspace:**	

Airport Information

Airport:	Broken Bow Municipal BBW	**Runway Surface Type:**	Concrete
Airport Elevation:	2547 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	14	**IFR Approach:**	None
Runway Length/Width:	4203 ft / 75 ft	**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious	**Latitude, Longitude:**	41.436389,-99.642219(est)

Administrative Information

Investigator In Charge (IIC):	Sorensen, Timothy
Additional Participating Persons:	Richard J Love; FAA – Flight Standards; Lincoln, NE Kris Wetherell; Hawker Beechcraft Corporation; Wichita, KS Brian Weber; Hawker Beechcraft Corporation; Wichita, KS Rodney Martinez; Continental Motors, Inc.; Mobile, AL
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Note:	
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