Aviation Investigation Final Report

Location:	Eaton, Colorado	**Accident Number:**	CEN16FA011
Date & Time:	October 13, 2015, 11:34 Local	**Registration:**	N394CW
Aircraft:	Beech G35	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The commercial-rated pilot and passenger (who owned the airplane) were conducting a cross-country business flight. Several witnesses reported observing the accident airplane overhead; one witness stated that the engine made a "sputtering" sound like it was running out of gas. She stated that airplane was flying north and then turned west when it began to "nose dive" out of sight. A review of the radar data revealed that the airplane approached the destination airport from the southeast and proceeded north, tracking above the runway about 400 ft above ground level (agl). The airplane then climbed to 900 ft agl and continued northbound. About 8 miles north of the destination airport, the airplane was about 1,100 ft agl and then entered a left turn and descended. The last radar point showed the airplane on a southwest heading and about 350 ft agl. The airplane impacted the ground with its left wing low, cartwheeled to the right, and came to rest upright in a harvested corn field. The main wreckage was found about 460 ft southwest of the last radar point.

The accident airplane likely encountered low-level wind shear and clear air turbulence and a wind shift that switched from a gusting headwind to a gusting tailwind in a short amount of time.

The right main fuel tank, which the selector valve indicated was selected at the time of the accident, was found empty and was not breached. The engine carburetor did not contain any fuel. A postaccident examination of the engine and airframe did not reveal any preimpact mechanical malfunctions or anomalies that would have precluded normal operation.

The pilot reported that the main tanks were full and the tip tanks were empty, so it is likely that the airplane contained 60 gallons of fuel before departure. The radar data revealed that the accident flight was 3 hours 16 and minutes long. Based on the accident flight, the engine would have consumed about 40 gallons of fuel from initial taxi to the accident site. This should have left about 20 gallons remaining in the tanks, which would have been enough to fly to the destination airport in addition to reserve fuel. The accident airplane was equipped with a single fuel quantity indicator gauge for the six fuel tanks; only one tank could be monitored at any given time. Switches on the instrument panel allowed the pilot

to select which tank to monitor on the gauge. The pilot and airplane's new owner had limited experience in the airplane and with the airplane fuel indicating system, so they likely had the fuel indicator selected to another fuel tank and did not appropriately monitor the level of fuel in the right main tank, which was selected to feed the engine. Based on witness statements and the evidence obtained on-scene, it is likely that the engine was starved of available fuel. Once engine power was lost, the pilot then failed to maintain control of the airplane while flying in gusting wind and low-level wind shear conditions.

Probable Cause and Findings

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

The pilot's loss of airplane control in gusting wind conditions and low-level wind shear, following a loss of engine power due to fuel starvation. Contributing to the accident was the pilot's failure to properly monitor the fuel level inflight because of his unfamiliarity with the fuel system.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Fuel - Fluid management
Aircraft	Fuel - Incorrect use/operation
Personnel issues	Monitoring equip/instruments - Pilot
Personnel issues	Knowledge of equipment - Pilot
Personnel issues	Total experience w/ equipment - Pilot
Environmental issues	Windshear - Effect on operation
Environmental issues	Gusts - Effect on operation

Factual Information

History of Flight

Approach	Collision with terr/obj (non-CFIT)
Approach	Fuel starvation
Approach	Loss of control in flight (Defining event)
Approach	Windshear or thunderstorm

On October 13, 2015, at 1134 mountain daylight time (MDT), a Beech G35 airplane, N394CW, collided with terrain near Eaton, Colorado. The commercial rated pilot and passenger were fatally injured. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident and no flight plan was filed. The flight originated from the Lyons-Rice County Municipal Airport (LYO), Lyons, Kansas, at 0918 central daylight time (CDT) and was destined for the Greeley-Weld County Airport (GXY), Greeley, Colorado.

The LYO airport manager stated that the accident airplane was purchased by a new owner on October 10, 2015, who rented a hangar at LYO to store the airplane. On the morning of the accident the owner arrived at LYO about 0800. The airport manager helped the owner pull the airplane out of the hangar and service the main fuel tanks with a total of 17.4 gallons of 100 low-lead fuel. The new owner had never moved or fueled the airplane. The manager added that the accident pilot was not present during the fueling process. The pilot and the owner departed after 0900 and were flying to GXY for a meeting.

Several witnesses reported observing the accident airplane overhead and the engine made a "sputtering" sound as if it was running out of fuel. The airplane was flying north and then turned west when it began to "nose dive" out of sight. The witnesses found the airplane crashed in a harvested corn field.

A review of the radar information revealed the airplane departed LYO at 0918 CDT and proceeded northwest. At 1127 MDT the airplane approached GXY from the southeast and proceeded north, tracking about 400 ft agl above the runway. The airplane climbed to 900 ft agl and continued northbound. About 8 miles north of GXY the airplane was about 1,100 ft agl, then entered a left turn and descended. At 1134 MDT, the last radar point showed the airplane on a southwest heading about 350 ft agl. The main wreckage was found about 460 ft from the last radar point on a heading of 215 degrees.

About 1130 MDT, two GXY airport employees heard an expletive on the universal communications (UNICOM) radio. There were no other transmissions or formal contact over the UNICOM radio.

Pilot Information

Certificate:	Commercial	**Age:**	35,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; 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:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	March 13, 2014
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	July 31, 2015
Flight Time:	464 hours (Total, all aircraft), 2.5 hours (Total, this make and model), 360 hours (Pilot In Command, all aircraft), 24.2 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		**Age:**	41,Male
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	Lap only
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:			

The pilot, age 35, held a commercial pilot certificate with ratings for airplane single engine land, multi-engine land, and airplane single engine sea and instrument airplane. He also held flight instructor certificate with a rating for single engine airplane. On March 13, 2014, the pilot received a first class Federal Aviation Administration (FAA) medical certificate with no limitations; however, it was valid as a third class medical certificate at the time of the accident. At the time of the exam, the pilot reported his flight experience included 290.9 total hours with 50.8 hours in the last six months.

A review of the pilot's logbooks revealed that his total flight experience included 464 total hours, 131 hours in the accident airplane make and model, 24.3 hours in the last 30 days, 1.5 of which were in the accident airplane.

The pilot's wife stated that he planned to fly the airplane owner to GXY for a meeting and believed that the accident flight was not an instructional flight, only a business flight.

The passenger (airplane owner), age 41, submitted an application for a combined student pilot certificate and third class medical certificate on March 6, 2013; the pilot was not issued that certificate. On the application for the certificate he did not report any flight experience; however, a previous medical application that was submitted on February 11, 2000, listed 5 total hours with 0 hours in last six months.

The owner's wife stated that he was not a pilot and had not yet started flight training.

An LYO airport employee who interacted with the owner and accident pilot stated that the owner was to begin flight lessons with the accident pilot in the future.

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N394CW
Model/Series:	G35	**Aircraft Category:**	Airplane
Year of Manufacture:	1956	**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	D-4863
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 7, 2015 Annual	**Certified Max Gross Wt.:**	2778 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	5091 Hrs as of last inspection	**Engine Manufacturer:**	Continental Motors
ELT:	C91 installed, not activated	**Engine Model/Series:**	E225-8
Registered Owner:	On file	**Rated Power:**	225 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The Beech G35 Bonanza, serial number D-4863, was a four place, low wing, high performance airplane with retractable landing gear and was manufactured in 1956. The airplane was equipped with a Continental Motors E225-8 engine, which drove a two-bladed, constant speed metal Hartzell propeller.

A review of the airplane's logbooks revealed that on May 7, 2015, an airframe annual inspection was completed at a total time of 5,091 hours. Also, a 100-hour inspection was completed on the engine and propeller at a tachometer time of 778.60 hours.

The airplane was still registered to the previous owner because the updated registration paperwork had not been filed with the FAA.

The previous airplane owner stated that on October, 10, 2014, the new owner and the accident pilot retrieved the airplane after the sale was complete and flew the airplane to LYO. He noted that the main and auxiliary fuel tanks were full of 100 low-lead fuel, and the wing tip tanks were empty. The airplane was equipped with a dual control arm with a control yoke installed on the left side and no yoke installed on the right side. The original throw over yoke was disconnected, but remained in the airplane; the push-to-talk button remained functional.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KGXY,4697 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	11:35 Local	**Direction from Accident Site:**	173°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / 16 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	340°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.2 inches Hg	**Temperature/Dew Point:**	26°C / -4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LYONS, KS (LYO)	**Type of Flight Plan Filed:**	None
Destination:	GREELEY, CO (GXY)	**Type of Clearance:**	None
Departure Time:	09:18 Local	**Type of Airspace:**	Class E

The accident pilot requested and received a Lockheed Martin Flight Services (LMFS) online weather briefing at 1630 MDT on October 12. The LMFS online weather briefing contained all the standard weather information and forecast valid from 1630 MDT on October 12. The weather forecast products such as Airmen's Meteorological Information (AIRMETs) and Area Forecast were only valid through 2100 MDT on October 12 (AIRMET) or 0100 MDT on October 13 (Area Forecast). There was no record of the accident pilot receiving or retrieving any other weather information before or during the accident flight.

An NTSB Meteorologist produced an official Weather Study Report based on the local weather conditions around the time of the accident. The report can be found in the public docket. The information below has been summarized from the Weather Study Report.

At 1115 MDT, the GXY weather station reported wind from 340° at 14 knots with gusts to 19 knots, 10 miles visibility, clear skies below 12,000 ft agl, temperature 26° C, dew point -3° C, and an altimeter setting of 30.21 inches of mercury.

At 1135 MDT, the GXY weather station reported wind from 340° at 9 knots with gusts to 16 knots, 10 miles visibility, clear skies below 12,000 ft agl, temperature of 26° C, dew point temperature of -4° C, and an altimeter setting of 30.21 inches of mercury.

About the accident time, several pilot reports (PIREPs) were submitted near the accident area and mostly characterized the turbulence as extreme-severe and moderate in some cases.

An AIRMET Tango was issued at 0845 MDT and was valid for the accident site at the accident time. The AIRMET forecasted moderate turbulence below flight level 180.

The weather observations from GXY indicated visual flight rules (VFR) ceilings at the surface at the

time of the accident with no visibility restrictions. The surface wind was gusting at GXY with wind between 10 and 20 knots and a varying wind direction switching from a surface wind from the northwest to a surface wind from the northeast, and to the east by 1335 MDT. A frontal boundary at the surface moved southwest across the accident area and this frontal boundary was a focus area for low-level wind shear (LLWS) and turbulence.

Airport Information

Airport:	GREELEY-WELD COUNTY GXY	**Runway Surface Type:**	Asphalt
Airport Elevation:	4696 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	35	**IFR Approach:**	None
Runway Length/Width:	10000 ft / 100 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	40.566112,-104.654441(est)

The accident site was a harvested corn field about 8 miles north of GXY, latitude 40°33'55.52" N / longitude 104°39'16.60" W, elevation 4,843 ft mean sea level (msl).

The wreckage path was defined by three distinct impact points and then the main wreckage oriented on a 230 degree heading. The first impact point was a long thin impact area with pieces of red glass near the far left side. The next impact point was a crater surrounded by airplane debris and broken windscreen; the dirt was disturbed toward the main wreckage. The final impact point was a long thin impact area with pieces of green glass near the far right side. The airplane came to rest upright about 45 ft from the impact crater and was orientated on a heading of 303 degrees. Airplane debris was found in the wreckage path from the initial impact point to the main wreckage and in the immediate surrounding area. All major components of the airplane were found at the accident site.

The windscreen was broken and pieces were found in the main wreckage. The nose keel structure, with the engine partially attached, separated from the fuselage bottom. The keel and engine were inverted and under the right wing. The right wing remained attached the fuselage and was distorted upward near mid-span and the right wing tip was separated. The right main landing gear assembly was extended and the right inboard landing gear door was closed. The left wing was impact damaged and the outboard half was separated; the inboard section remained attached to the fuselage. The left main landing gear assembly was collapsed into the external side of the closed inboard landing gear door. The rear fuselage was found buckled to the left. The empennage and flight control surfaces were not visibly damaged. The

cabin door was found separated.

The dual flight control arm was found impact separated in the wreckage. A single control yoke was found next to the control arm and separated. A throw over yoke was found in the wreckage path with blue tape covering the installation mount. The aileron chain was separated from aileron sprocket, which remained attached to the backside of the firewall. The aileron control cables remained attached to chain links. The left aileron bell crank balance arm was separated. The right aileron bell crank remained intact. The elevator control cable remained attached to the control column. The rudder cables remained attached to the forward rudder bell crank. The rudder and elevator flight controls located in the rear fuselage remained intact and attached to the control surfaces.

The fuel mixture, throttle, and propeller control knobs were observed in a full forward position. The selector valve was positioned to the right main tank. The fuel quantity indicator switches were impact damaged and their positions could not be determined. The right wing was elevated due to the right main landing gear being extended and the left main landing gear being collapsed. An examination of the fuel tank revealed the following fuel quantities:

Right MAIN — Empty (20 gallon capacity)

Right AUX — 4 to 4.5 gallons of fuel (10 gallon capacity)

Right TIP – Empty (15 gallon capacity)

Left MAIN — 1 gallon of fuel, tank was breached (20 gallon capacity)

Left AUX — Tank was breached and empty (10 gallon capacity)

Left TIP – Empty, tank was separated and breached (15 gallon capacity)

Note: each AUX tank should contain the same quantity of fuel, since the outputs are interconnected.

The engine was manually rotated and all six cylinders produced suction and compression. The crankshaft appeared to be undamaged. Continuity was established by manually rotating the engine and observing timing gear, magneto and camshaft rotation. When rotated by hand, both magnetos produced sparks at each ignition lead. A lighted borescope inspection was performed and all exhaust and intake valves were intact. When compared to a Champion "Check A Plug" chart, sparkplugs from the No. 1 cylinder were "worn out severe", while sparkplugs from Nos. 2, 3, 4, 5 and 6 exhibited normal wear signatures. The carburetor was intact with damage noted to the mounting flange. The fuel screen was removed and a small quantity of contamination was noted. No fuel was found in carburetor. The carburetor throttle control and mixture arms remained attached and secured. The engine driven fuel pump was separated from the accessory case and remained attached by a fuel hose. The fuel pump housing was impact damaged and could not be rotated. The drive coupling and gear were not observed.

The two propeller blades were designated A and B for documentation purposes only. Blade A remained attached to the propeller hub, but was loose in the hub assembly. The blade displayed scratching and scoring on the cambered face and a smooth rearward bending signature beginning about 16 inches from

the blade root. Blade B separated from the hub and exhibited a smooth forward bending signature beginning about eight inches from the blade hub. There was a deep gouge on the trailing edge about five inches from the blade tip.

The postaccident examination of the engine and airframe did not reveal any preimpact mechanical malfunctions or anomalies that would have precluded normal operation.

Medical and Pathological Information

On October 14, 2015, an autopsy was performed on the pilot at the Weld County Coroner's Office, Loveland, Colorado. The cause of death was listed as multiple blunt force injuries and the manner of death was ruled an accident. The FAA Civil Aerospace Medical Institute completed a Final Forensic Toxicology Fatal Accident Report which was negative for tested-for-drugs.

On October 14, 2015, an autopsy was performed on the passenger at the Weld County Coroner's Office, Loveland, Colorado. The cause of death was listed as multiple blunt force injuries and the manner of death was ruled an accident. The FAA Civil Aerospace Medical Institute completed a Final Forensic Toxicology Fatal Accident Report which was negative for tested-for-drugs.

Additional Information

Electronic Devices

An iPad, iPhone, and Dual SkyPro XGPS160 were recovered from the accident site and sent to NTSB Recorders Laboratory for examination and download.

- The iPad was impact damaged and data recovery was not possible.

- The iPhone contained a ForeFlight application which revealed a route "KLYO KGXY" on the device screen. The distance computed by ForeFlight for the route was 322 nautical miles, a time enroute of 2 hours and 28 minutes, and a fuel consumption of 24.7 gallons.

- When the iPhone was observed at the accident site it was on and the ForeFlight screen was shown. At that time the distance computed by ForeFlight for the route was 322 nautical miles, a time enroute of 2 hours and 32 minutes, a fuel consumption of 25.9 gallons, airspeed 150 mph, and a fuel consumption rate of 10 gallons per hour (gph).

- Data from the Dual SkyPro XGPS160, a battery powered GPS receiver, was downloaded normally and revealed a flight log from September 17, 2015, and was not pertinent to the investigation.

Fuel Quantity Indicator

The accident airplane was equipped with a single fuel quantity indicator gauge. Switches on the instrument panel allowed the pilot to select which tank to monitor on the gauge. Only one tank could be monitored at any given time.

Fuel Consumption

The previous owner stated that he told the accident pilot and owner to set the engine to 2,350 rpm and 23.5 inches of manifold pressure (MP) which would yield fuel consumption about 12 gph. He also told them to begin flying on the left tank for 1 hour and 15 minutes, switch to right tank for 1 hour and 20 minutes, then to the aux tanks for 1 hour and 15 minutes. He stated that this method would keep the fuel even in the tanks.

On October 10, 2105, the accident pilot flew the owner in the accident airplane to LYO after the airplane was purchased. The flight time was 1.5 hours and 17.4 gallons were consumed. This yielded a fuel consumption rate of 11.6 gph.

Administrative Information

Investigator In Charge (IIC):	Lindberg, Joshua
Additional Participating Persons:	Wesley Dollahite; FAA; Denver, CO Paul Yoos; Textron Aviation; Wichita, KS Mike Council; Continental Motors; Mobile, AL
Original Publish Date:	October 4, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=92167