Aviation Investigation Final Report

Location:	Telluride, Colorado	**Accident Number:**	CEN14FA141
Date & Time:	February 16, 2014, 11:26 Local	**Registration:**	N400DJ
Aircraft:	Beech 35/33	**Aircraft Damage:**	Substantial
Defining Event:	Collision during takeoff/land	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The airplane departed the airport (which is at an elevation of 9,070 ft mean sea level [msl]) for a day cross-country flight in instrument meteorological conditions. The airplane wreckage was found 1/2 mile from the end of the departure runway in steep mountainous terrain 300 ft below a cliff band at an elevation of about 8,760 ft msl, which indicates that the airplane had not obtained a positive climb rate. The airplane impacted terrain in a wings-level attitude and was damaged by impact and a postimpact fire. An examination of the airplane, engine, and related systems revealed no mechanical anomalies that would have precluded normal operation.

At the high end of the airplane's estimated weight, it would have just met the airport's required climb performance to clear the terrain beyond the end of the runway. Other factors that may have been present at the time of the accident, including the weather, mountainous terrain, and snow or ice accumulation before takeoff, could have adversely affected the airplane's climb performance; however, it could not be determined to what extent these factors played a role. It is likely that the airplane did not establish a positive climb rate after takeoff and, based on the wreckage orientation, that the pilot flew the airplane directly into the terrain. It could not be determined what preflight planning the pilot conducted for the flight, including whether or not she received a weather briefing.

Probable Cause and Findings

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

The airplane's failure to obtain a positive climb rate, which resulted in controlled flight into terrain. Contributing to the accident was the pilot's inadequate preflight planning.

Findings

Environmental issues	Snow - Not specified
Environmental issues	Low visibility - Not specified
Aircraft	Climb rate - Not attained/maintained
Personnel issues	Performance calculations - Pilot

Factual Information

History of Flight

Takeoff	Collision during takeoff/land (Defining event)

On February 16, 2014, at 1126 mountain standard time, a Beech 35-33, N400DJ, impacted mountainous terrain, ½ mile west of the Telluride Regional Airport (KTEX), Telluride, Colorado. The female airline transport certificated pilot, the flight instructor, and one airline transport pilot-rated passenger were fatally injured. The airplane was substantially damaged and a postimpact fire ensued. The airplane was registered to and operated by Arizona Cloudbusters Flying Club, Gilbert, Arizona, under the provisions of 14 Code of Federal Regulations Part 91 as a training flight. Instrument meteorological conditions prevailed for the flight, which operated on an instrument flight rules flight plan. The flight was originating at the time of the accident and was en route to Cortez Municipal Airport (KCEZ), Cortez, Colorado.

The time sources for the text messages, airport UNICOM, airport camera, and the Federal Aviation Administration (FAA) radar were different. The times provided in this report are as provided from each source and were not corrected or adjusted for any variation or discrepancy. For the purposes of this report, the FAA time stamp was used to determine the time of the accident.

According to the president of the Arizona Cloudbusters Flying Club, this was an instructional flight for the female airline transport pilot (ATP), to complete her airplane checkout as a new member of the flying club. Most likely the airplane departed Stellar Airpark (P19), Chandler, Arizona, full of fuel, and flew directly to KTEX. Their intention was to continue to KCEZ, refuel, and then return to P19.

A family member of the flight instructor received a text message from him at 1040 stating that they had landed in Telluride. At 1120, the flight instructor sent another text message indicating that they would be taking off in 5 minutes.

According to airport employees, the three pilots came in to the fixed base operator, took refreshments, and purchased t-shirts. They did not take any services. At 1108, one of the pilots called on the UNICOM frequency and reported that they were taxing from the ramp for departure. At 1118, they called and reported that they were taking the runway for departure. A camera positioned on the firehouse at the airport recorded the accident airplane departing runway 27 and passing the alpha 3 intersection at 1120:26. No other communications were heard on the UNICOM.

At 1120:38, the Denver Automated Flight Service Station (AFSS) contacted the Denver Center Sector 12 controller and requested a clearance for N400DJ. The Denver AFSS was communicating with the female ATP over Denver Radio when the clearance was requested. The Denver Center Sector 12 controller provided the clearance via the Denver AFSS. The flight was cleared from KTEX to KCEZ via the instrument flight rules (IFR) departure procedure to Cones, direct Dove Creek, and then direct KCEZ, at an altitude of 14,000 feet. The flight was instructed to contact Denver Center leaving 11,000 feet, and the clearance was void if they had not departed KTEX by 1130. The flight plan for the accident

flight was not filed with the Denver AFSS, through the FAA, or through DUATS. Investigators were not able to determine what source the pilots used to file their flight plan and were unable to determine the entire contents of the flight plan.

Radar data provided by the FAA, identified and depicted the accident flight as the airplane started its takeoff roll at 1125:15. The last location of the airplane was recorded at 1126:27, just off of the departure end of runway 27, at an altitude of 9,000 feet mean sea level (msl). The pilots never established contact with air traffic control and an Alert Notification for a missing airplane was issued. Search and Rescue volunteers located the wreckage later that evening. There were no known witnesses to the accident.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	56
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	February 1, 2014
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 1, 2014
Flight Time:	13300 hours (Total, all aircraft), 1 hours (Total, this make and model)		

Flight instructor Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	48
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	January 8, 2013
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 1166 hours (Total, all aircraft), 1 hours (Total, this make and model)		

Pilot-rated passenger Information

Certificate:	Airline transport; Commercial; Flight engineer	**Age:**	64
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	September 9, 2013
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 28000 hours (Total, all aircraft), 1 hours (Total, this make and model)		

Female ATP

The female ATP pilot, age 56, held an airline transport pilot certificate with an airplane multiengine land rating, a commercial pilot certificate with an airplane single engine land rating, and type certificates in the B-747, B-747-4, B-757, B-767, B-777, BA-3100, LR-Jet, and A-320. She also held a flight instructor certificate with airplane single and multiengine, and instrument airplane ratings issued on January 30, 2013. She was issued a first class airman medical certificate on February 1, 2014. The certificate contained the limitation "Must wear corrective lenses."

On the female ATP pilot's last application for medical certificate she reported 13,300 hours total time; 400 hours of which were recorded in the past 6 months. According to the flight club records, she had successfully completed the requirements of a flight review in January of 2014. Investigators did not establish the female ATP pilot's instrument currency or flight time and experience in the make and model of the accident airplane.

Flight Instructor

The flight instructor, age 48, held an airline transport pilot certificate with an airplane single-and multiengine land ratings, and a commercial pilot certificate with rotorcraft helicopter and instrument helicopter ratings. He also held a flight instructor certificate with airplane single and instrument airplane ratings issued on March 21, 2013. He was issued a second class airman medical certificate without limitations on January 8, 2013.

On the flight instructor's last application for medical certificate he reported 1,166 hours total time; 29 hours of which were recorded in the past 6 months. According to the flight club records, he had successfully completed the requirements of a flight review on June 4, 2013. Investigators did not establish the flight instructor's instrument currency or flight time and experience in the make and model of the accident airplane.

Male ATP

The male ATP pilot, age 64, held an airline transport pilot certificate with an airplane multiengine land rating, a commercial pilot certificate with an airplane single engine land and rotorcraft helicopter rating, and type certificates in the EMB-120, DHC-7, B-737, and A-320. He was issued a first class airman medical certificate on September 9, 2013. The certificate contained the limitation "Must wear corrective lenses."

On the male ATP pilot's last application for medical certificate he reported 28,000 hours total time; 300 hours of which were recorded in the past 6 months. According to the flight club records, he had successfully completed the requirements of a flight review on December 18, 2013. Investigators did not establish the male ATP pilot's instrument currency; he had completed his check out in the airplane the week prior to the accident flight.

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N400DJ
Model/Series:	35/33	**Aircraft Category:**	Airplane
Year of Manufacture:	1960	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	CD-40
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	November 1, 2013 Annual	**Certified Max Gross Wt.:**	3003 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	4509.6 Hrs as of last inspection	**Engine Manufacturer:**	Continental Motors
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	I0-470-N11B
Registered Owner:	ARIZONA CLOUDBUSTERS INC	**Rated Power:**	260 Horsepower
Operator:	ARIZONA CLOUDBUSTERS INC	**Operating Certificate(s) Held:**	None

The accident airplane, a Beech 35-33 (serial number CD-40), was manufactured in 1960. It was registered with the FAA on a standard airworthiness certificate for normal operations. A Continental Motors IO-470-N11B engine rated at 260 horsepower at 2,625 rpm powered the airplane. The engine was equipped with a 2-blade, Hartzell propeller. The airplane was maintained and current for instrument flight.

The airplane was registered to and operated by Arizona Cloudbusters Inc., and was maintained under an annual inspection program. A review of the maintenance records indicated that an annual inspection had been completed on November 1, 2013, at an airframe total time of 4,509.6 hours. The last maintenance performed on the airframe was on January 28, 2014, at a total airframe time of 4,550.0 hours. An electronic tachometer was installed during this maintenance. January 9, 2014, the engine oil was changed at a reported engine total time of 76.4 hours.

The airplane was originally equipped with a Continental IO-470-J engine, rated at 225 horsepower at 2,600 rpm. According to the engine maintenance records, the Continental Motors IO-470-N11B engine installation was completed on November 1, 2013. This was accomplished under the supplemental type certificate (STC) SA09603SC, held by Hammock Aviation Services, Inc. The first page of the supplement stated, in part, that the information contained in the document "supplements or supersedes the Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance not contained in this supplement, consult the Airplane Flight Manual."

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KTEX,9070 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	11:35 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	1000 ft AGL	**Visibility**	2 miles
Lowest Ceiling:	Overcast / 1400 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.17 inches Hg	**Temperature/Dew Point:**	0°C / -1°C
Precipitation and Obscuration:	Light - None - Snow		
Departure Point:	Telluride, CO (KTEX)	**Type of Flight Plan Filed:**	IFR
Destination:	Cortez, CO	**Type of Clearance:**	IFR
Departure Time:		**Type of Airspace:**	

Infrared satellite imagery of Colorado displayed overcast clouds directly over the accident site. The cloud tops around at the accident site were around 23,000 feet. Doppler weather radar depicted light precipitation returns in the area at the time of the accident.

The National Weather Service (NWS) had issued AIRMET (Airman's Meteorological Information) TANGO for moderate turbulence below flight level 180. There were no SIGMETs issued for the area at the time of the accident.

The closest official weather observation station was KTEX, Telluride, Colorado, located ½ nautical mile east of the accident site. The elevation of the weather observation station was 9,070 feet msl. The automated weather observing station (AWOS) for KTEX, issued at 1135, reported, wind 080 degrees at 4 knots, visibility 1.5 miles with light snow, sky condition clouds broken at 1,000 feet, overcast at 1,400 feet, temperature 0 degrees Celsius (C), dew point temperature minus 1 degrees C, altimeter 30.17 inches.

Calculations of relevant meteorological data revealed that the density altitude was 9,230 feet, and the pressure altitude was 8,840 feet.

There was no record that any of the pilots obtained a weather briefing from the FAA Flight Service Station or Direct User Access Terminal System (DUATS) for the accident flight. One record for the

accident airplane registration was located for a flight in Arizona on the day prior to the accident. It could not be determined which resources were used by any of the pilots prior to the flight.

Investigators were not able to determine what actions the pilots may have taken to remove any snow or ice which may have accumulated on the airplane prior to flight.

Airport Information

Airport:	Telluride Regional Airport KTEX	**Runway Surface Type:**	
Airport Elevation:	9070 ft msl	**Runway Surface Condition:**	
Runway Used:	27	**IFR Approach:**	None
Runway Length/Width:	7111 ft / 100 ft	**VFR Approach/Landing:**	None

Telluride Regional Airport (KTEX), Telluride, Colorado, is a public, uncontrolled airport located 5 miles west of Telluride, Colorado, at a surveyed elevation of 9,070 feet. The airport had one open runway, runway 9/27 (7,111 feet by 100 feet, asphalt). The airport had three instrument approaches. KTEX also had specific takeoff minimums and obstacle departure procedures. For runway 27, standard instrument flight rules (IFR) takeoff minimums applied which required one statute mile visibility. In addition, the departure procedure required that the airplane climb at 463 feet per nautical mile to 10,500 feet. In instrument meteorological conditions, the departure procedure required that the airplane climb to 12,000 feet via heading 273 degrees and intercept the 096 radial of the Cones (ETL) VOR.

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	37.960277,-107.929725

The accident site was located in steep mountainous terrain, 300 feet down from the top of a cliff band, ½ mile west of the departure end of runway 27. The accident site was at an elevation of 8,760 feet msl and the airplane impacted on a magnetic heading of 270 degrees. A coniferous tree located directly behind/beneath the main wreckage exhibited broken branches at the top of the tree.

The main wreckage included the fuselage, the left and right wing, the empennage, and the engine and propeller assembly. The airplane was impact and fire damaged. The propeller separated from the engine and was located uphill, a few feet west of the wreckage. Broken plexiglass and torn metal was located in the ground between the propeller and the main wreckage.

The fuselage consisted of the cabin, airplane seats, and the instrument panel. The cabin was impact damaged and was charred, melted, and partially consumed by fire. The instrument panel was impact and fire damaged. Many of the instruments were destroyed and neither the instruments nor radios conveyed reliable readings. The fire damage extended aft to the aft portion of the fuselage and the forward empennage.

An outboard section of the right wing and a section of the right aileron separated and were located downhill, just beneath the main wreckage. The leading edge of the right wing was impact damaged and the inboard portion of the right wing exhibited fire damage. The right flap was in a position consistent with flaps retracted. Control continuity to the right aileron was confirmed from the aileron inboard to the forward fuselage. Impact and fire damage precluded confirmation to the cockpit flight control yoke. The right main landing gear was located within the wheel well.

The left wing included the left aileron and left flap. The leading edge of the left wing exhibited impact damage consistent with contact with the tree directly behind (downhill from) the main wreckage. The inboard portion of the wing exhibited impact and fire damage. The left flap was in a position consistent with a flaps retracted position. Control continuity to the left aileron was confirmed to the forward fuselage. Impact and fire damage precluded confirmation to the cockpit flight control yoke. The left main landing gear was located within the wheel well.

The empennage included the horizontal and vertical stabilizer, the elevator, and the rudder. The empennage was not damaged. Control continuity to the elevator and rudder was confirmed to the forward fuselage. Impact and fire damage precluded control continuity confirmation to the cockpit flight control yoke and the rudder pedals.

Medical and Pathological Information

The female ATP was located in the front of the airplane wreckage. The coroner was not able to determine the seat positions of the two male passengers.

Female ATP

The autopsy was performed on the female ATP by the Montrose Memorial Hospital – Division of Forensic Pathology, on February 18, 2014, as authorized by the San Miguel County Coroner's Office. The autopsy concluded that the cause of death was multiple traumatic injuries and the report listed the specific injuries.

The FAA's Civil Aerospace Medical Institute (CAMI), Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological tests on specimens that were collected during the autopsy (CAMI Reference #20140002203). Tests for carbon monoxide and cyanide were not performed. Results were negative for ethanol and drugs.

Flight Instructor

The autopsy was performed on the flight instructor by the Montrose Memorial Hospital – Division of Forensic Pathology, on February 18, 2014, as authorized by the San Miguel County Coroner's Office. The autopsy concluded that the cause of death was multiple traumatic injuries and the report listed the specific injuries.

CAMI performed toxicological tests on specimens that were collected during the autopsy (CAMI Reference #201400022001). Tests for cyanide were not performed. Results were negative for carbon monoxide and ethanol. Cetirizine was detected in the urine and blood. Cetirizine, marketed as Zyrtec, is used to temporarily relieve allergy symptoms.

Male ATP

The autopsy was performed on the male ATP by the Montrose Memorial Hospital – Division of Forensic Pathology, on February 18, 2014, as authorized by the San Miguel County Coroner's Office. The autopsy concluded that the cause of death was multiple traumatic injuries and the report listed the specific injuries.

CAMI performed toxicological tests on specimens that were collected during the autopsy (CAMI Reference #201400022002). Tests for carbon monoxide and cyanide were not performed. Results were negative for ethanol and drugs.

Tests and Research

The wreckage of the airplane was recovered to a hangar in Greeley, Colorado. Investigators from the National Transportation Safety Board and Continental Motors, Inc., examined the engine and propeller assembly.

The engine was impact damaged and exhibited exposure to heat and fire. During the examination, the top spark plugs, valve covers, fuel pump, vacuum pump, fuel nozzles, oil pump, and fuel manifold were removed. The engine was rotated through at accessory housing. A blue spark was noted on all leads. Thumb compression, continuity, and valve movement were noted on all cylinders.

Spark plugs exhibited normal signatures when compared to the Champion Spark Plug Chart. Fuel nozzles were free of visible contamination. The fuel manifold screen was clean and no fuel was observed within the fuel manifold. The fuel pump was difficult to rotate by hand. The spline was intact and the vanes exhibited exposure to heat and fire.

The spinner was crushed and torn in a rotational direction. The propeller blades were labeled "A" and "B" for identification purposes. Blade A was bent aft approx. 90 degrees and twisted along the blade length. The blade exhibited leading edge scratching and scratches on the blade face. The trailing edge outboard portion of blade was torn in several locations. Blade B was bent aft about 90 degrees and twisted along the blade length. The blade exhibited leading edge scratching and scratches on the blade face.

The throttle control lever was impact damaged and the arm was loose. Further examination of the throttle control arm exhibited that the throttle shaft was bent and the machined splines were sheared which resulted in the throttle arm disengaging. The bent shaft and sheared splines were a result of impact damage.

Additional Information

Airplane Performance

According to the Beech 33 Airplane Flight Manual, Section V Performance, the climb table uses temperature, pressure altitude, and airplane weight to estimate the climb performance of the airplane. The estimated climb performance is based upon full throttle at 2,600 rpm, a leaned fuel mixture, flaps and landing gear up, and 90 knots.

The following parameters were used by investigators to estimate the climb performance:

- Outside Air Temperature of 0 degrees C/32 degrees Fahrenheit
- Pressure Altitude of 8,840 feet
- Estimated airplane weight of 2,600 to 2,700 pounds

Based upon these parameters it is estimated that the climb capability of the ranged between 700 feet and 750 feet per minute.

The STC for the modified engine included an FAA approved Airplane Flight Manual Supplement. In section 5, Performance, the climb speed was listed at 90 knots and the cruise climb speed was listed at 104 knots. A climb performance chart was not provided. The actual climb performance of the airplane with the modified engine is not known.

Administrative Information

Investigator In Charge (IIC):	Rodi, Jennifer
Additional Participating Persons:	Kent Gibbons; Federal Aviation Administration; Salt Lake City, UT Paul E Yoos; Beechcraft; Wichita, KS Mike Council; Continental Motors, Inc; Mobile, AL
Original Publish Date:	March 10, 2015
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=88805