Aviation Investigation Final Report

Location:	Carrollton, Georgia	**Accident Number:**	ERA16FA312
Date & Time:	September 7, 2016, 10:48 Local	**Registration:**	N6027K
Aircraft:	Beech F33	**Aircraft Damage:**	Substantial
Defining Event:	Midair collision	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The Diamond flight instructor and student pilot were in the traffic pattern at the non-towered airport practicing landings. The Beech pilot entered the traffic pattern on an extended left downwind leg with the intention of landing. Pilots of other airplanes in the pattern reported that the Diamond instructor was making standard traffic pattern callouts on the common traffic advisory frequency (CTAF); however, the Beech pilot was not transmitting on the CTAF. Witness observations, radar data, GPS data, and examination of the wreckage of the two airplanes revealed that, while both airplanes were on final approach for landing, the Beech overtook the Diamond from above and behind. The landing gear of the Beech struck the horizontal stabilizer and elevator of the Diamond, and then both airplanes abruptly descended into the terrain short of the runway. The Beech came to rest inverted and on top of the Diamond. An examination of wreckage of both airplanes did not reveal evidence of any preaccident anomalies or malfunctions.

Testing of the Beech's VHF communications radio revealed that it was set to an old CTAF frequency for the airport that had been changed about 5 years before the accident. A local airport frequency card dated 7 years before the accident that was found in the Beech's cockpit listed the old CTAF frequency that was set in the Beech's radio. Another pilot at a different airport heard the Beech pilot making pattern calls on the incorrect frequency about the time of the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the Beech pilot to see and avoid the Diamond that was in front of and below his airplane on final approach and his use of an incorrect radio communication frequency for the airport.

Findings

Aircraft	VHF communication system - Incorrect use/operation
Personnel issues	Use of equip/system - Pilot
Personnel issues	Use of policy/procedure - Pilot
Personnel issues	Monitoring other aircraft - Pilot

Factual Information

History of Flight

Approach-VFR pattern final	Midair collision (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On September 7, 2016, at 1048 eastern daylight time, a Beech F33A, N6027K, and a Diamond Aircraft Industries DA20-C1, N85WP, collided in midair on the final approach leg of the traffic pattern to runway 35 at West Georgia Regional Airport (CTJ), Carrollton, Georgia. The Beech was substantially damaged, and the private pilot was fatally injured. The Diamond was destroyed, and the flight instructor and the student pilot were fatally injured. The Beech was registered to and operated by the private pilot. The Diamond was registered to and operated by Falcon Aviation Academy LLC. Both flights were conducted under the provisions of 14 *Code of Federal Regulations (CFR)* Part 91; the Beech pilot was conducting a personal flight, and the Diamond pilots were conducting an instructional flight. Visual meteorological conditions prevailed, and no flight plans were filed for either flight. The Beech departed from Fulton County Airport (FTY), Atlanta, Georgia, about 0915, and the Diamond departed from Newnan Coweta County Airport (CCO), Newnan, Georgia, about 1000.

According to personnel from Falcon Aviation Academy, the pilots of the Diamond were practicing traffic pattern operations and landings at CTJ. The Diamond entered the traffic pattern, followed a few minutes later by N263CF and then by N169PS, both Falcon Aviation Academy DA20s. The flight instructor and student pilot on board N263CF saw the Beech on the downwind leg of the traffic pattern. Moments later, the flight instructor and student pilot on board N169PS entered the traffic pattern from the east. They looked down and to the left, in the direction of the final approach path for runway 35, and saw two airplanes collide. The instructors and the students on board both trailing DA20s reported that they did not hear the Beech pilot broadcasting his intentions on the CTJ common traffic advisory frequency (CTAF) but they heard the accident Diamond making position calls in the traffic pattern before the collision, with the last call being made on the final approach.

Another flight instructor employed by Falcon Aviation Academy reported that he was familiar with the Beech pilot and his airplane. He had just completed a flight at CCO and heard the Beech pilot broadcasting traffic pattern calls for CTJ about the time of the accident; however, the Beech pilot was broadcasting over the CCO CTAF of 122.7 MHz. The flight instructor reported that the Beech pilot was not in the traffic pattern at CCO at the time of the transmissions.

Radar data provided by Federal Aviation Administration (FAA) air traffic control personnel indicated that the Beech pilot entered an extended left downwind for CTJ from the north, above and behind the accident Diamond, which was on the downwind leg of the traffic pattern. The ground speed of the Beech was about 50 knots greater than the ground speed of the Diamond. The last radar returns were on the downwind leg, about 2,000 ft above mean sea level, or about 850 ft above the ground. The locations of the last radar returns showed the airplanes approaching the base leg for runway 35.

The Diamond was not equipped with GPS data recording capability. A portable GPS receiver recovered

from the Beech recorded the accident flight. The recording indicated that the Beech was established on the downwind leg for runway 35, about 2,500 ft GPS altitude and 150 knots groundspeed. The CTJ airport elevation was 1,164 ft. The Beech descended toward the base leg, turning base about 2,200 ft and 122 knots. The Beech turned onto final about 1,450 ft and 79 knots. The last recorded data point was at 1048:00, with the Beech at 1,201 ft and 76 knots, about 607 ft south of the runway 35 threshold.

Pilot Information

Certificate:	Private	**Age:**	79,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	October 5, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 30, 2015
Flight Time:	2500 hours (Total, all aircraft)		

The Beech Pilot

The pilot of the Beech, age 79, held an FAA private pilot certificate with airplane single-engine land and instrument airplane ratings. He held an FAA third-class medical certificate with a restriction to have glasses available for near vision. He reported 2,500 total hours of flying experience on his FAA third-class medical certificate application that was dated October 5, 2015. His personal pilot logbook was not located.

According to the owner's representative (insurance adjuster), the Beech pilot reported that he completed a Beechcraft Pilot Proficiency Program on October 30, 2015, at Blairsville, Georgia. This was confirmed verbally and accepted as a current flight review by the insurance company.

The Diamond Flight Instructor

The flight instructor in the Diamond, age 24, held an FAA commercial pilot certificate with ratings for airplane multi-engine land, airplane single-engine land, and instrument airplane. She held an FAA flight instructor certificate with a rating for airplane single-engine, and she held an FAA first-class medical certificate with a restriction to wear glasses. She was seated in the right cockpit seat. She reported 600 total hours of flying experience on her FAA first-class medical certificate application that was dated March 16, 2016. A review of her pilot logbook revealed about 850 hours total time, including 721 hours in single-engine airplanes and 366 hours as a flight instructor.

The Diamond Student Pilot

The student pilot in the Diamond, age 20, held an FAA student pilot certificate. He held an FAA second-class medical certificate with no restrictions. He was seated in the left cockpit seat. He enrolled in the ab

initio training program at Falcon Aviation Academy on August 4, 2016, and had logged about 22 hours of flight time.

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N6027K
Model/Series:	F33 A	**Aircraft Category:**	Airplane
Year of Manufacture:	1978	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	CE-833
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	July 13, 2016 Annual	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	4549 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	Installed	**Engine Model/Series:**	IO-520-BB
Registered Owner:	On file	**Rated Power:**	285 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	

Beech

The off-white- and blue/gold-colored Beech F33A was a single-engine, low-wing airplane with a conventional tail. A review of the airplane's maintenance and airworthiness records revealed that an enhanced Whelen light-emitting diode (LED) wingtip position and anti-collision light system, model OR6502GE/OR6502RE, and a Whelen LED tail position and anti-collision light system, model OR5002V, were installed on the airplane per FAA Supplemental Type Certificate, dated November 10, 2014. The airplane was equipped with landing and taxi lights. The airplane was not equipped with a traffic advisory system (TAS), traffic alert and collision avoidance system (TCAS), or automatic dependent surveillance-broadcast (ADS-B) equipment or displays. The Beech's avionics suite included a King KX 155 VHF communication/navigation transceiver and a Garmin GNS 530 GPS/communication/navigation all-in-one unit.

According to information provided by the owner's representative, the Beech's most recent annual inspection was completed on or about July 13, 2016. At the time of the inspection, the airframe had accumulated about 4,549 total hours of operation.

Diamond

The white- and blue-colored Diamond DA20 was a single-engine, low-wing airplane with a T-tail configuration. It was equipped with wingtip-mounted anti-collision strobe lights and navigation position lights, and a landing and taxi light. The airplane was not equipped with a TAS, TCAS, ADS-B equipment or displays. The Diamond's avionics suite included an iCOM AC-A200 VHF air band transceiver and a Garmin GNS 430 GPS/communication/navigation all-in-one unit.

The Diamond's most recent annual inspection was completed on August 9, 2016. At the time of the inspection, the airframe had accumulated about 1,990 total hours of operation.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CTJ,1165 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	10:55 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 8500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.29 inches Hg	**Temperature/Dew Point:**	30°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	ATLANTA, GA (FTY)	**Type of Flight Plan Filed:**	None
Destination:	Carrollton, GA (CTJ)	**Type of Clearance:**	None
Departure Time:	09:15 Local	**Type of Airspace:**	Class G

The CTJ 1055 weather observation included wind calm, visibility 10 statute miles, scattered clouds at 8,500 ft, temperature 30°C, dew point 19°C, and an altimeter setting 30.30 inches of mercury.

Airport Information

Airport:	West Georgia Regional CTJ	**Runway Surface Type:**	Asphalt
Airport Elevation:	1164 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	35	**IFR Approach:**	None
Runway Length/Width:	5503 ft / 100 ft	**VFR Approach/Landing:**	Traffic pattern

CTJ was a public, non-towered, uncontrolled airport with a single runway, designated 17/35. The runway was 5,503 ft long and 100 ft wide. The published traffic pattern direction for runway 35 was to the left. Falcon Aviation Academy personnel reported that their pilots frequently used CTJ for training purposes.

The CTAF/UNICOM frequency for CTJ at the time of the accident was 122.975 MHz. CTAF communications were not recorded. The airport manager reported that the CTJ CTAF frequency was changed from 122.7 MHz to 122.975 MHz in 2011.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	33.623332,-85.149169

General

The main wreckage of both airplanes came to rest in a grass field, about 408 ft south of the approach end of runway 35, on the extended centerline of the runway. The Diamond came to rest in an upright position. The Beech came to rest inverted and on top of the Diamond wreckage. The wreckage debris field was about 350 ft long and about 80 ft wide, oriented on a heading of 350º. All major structural components of both airplanes were accounted for within the wreckage debris field.

Beech

The wreckage of the Beech was generally intact; the wings and empennage remained attached to the fuselage. Flight control cable continuity was established from the cockpit controls to the flight control surfaces. The ailerons, elevator, and rudder remained attached in their respective positions on the wings, horizontal stabilizer, and rudder. Blue-colored paint transfer marks were found on the lower surface of the right wing, near wing station 108. Impact damage with paint transfer was found on the top of the fuselage around station 131.

The nose gear separated from the airplane during the impact sequence. White paint transfer markings were observed on the nose gear tire. The left and right main landing gear were found in the extended positions. White paint transfer markings were observed on the left, main gear tire. The wing flaps were extended 20º.

The master and avionics switches were found in the "on" positions. The strobe light switch was found in the "on" position. The taxi light switch was found in the "on" position, and the landing light was found in the "off" position; however, both switches had impact damage. The position of the navigation light switch could not be determined because of impact damage.

The engine remained attached to the firewall. External examination of the engine did not reveal physical evidence of a mechanical malfunction or anomaly. The propeller assembly separated from the engine at the crankshaft/propeller flange junction. The fracture surfaces exhibited features consistent with overload. The propeller blades remained attached to the hub and displayed chordwise scratches, blade twisting, leading edge gouging, and surface polishing.

A laminated card titled "LOCAL AREA FREQ" and dated April 27, 2009, was found in the Beech's cockpit. The card, which listed the frequencies for multiple airports in the area, listed the frequency for the CTAF at CTJ as 122.7 MHz.

Diamond

The Diamond came to rest upright, under the wreckage of the Beech. Flight control continuity was confirmed from the elevator and rudder to the cockpit controls. Aileron control continuity was confirmed from the right aileron to the cockpit controls. The left wing separated from the fuselage during the impact sequence. The left aileron control tubes had multiple fractures that exhibited overload signatures. The empennage separated from the fuselage about 14 inches forward of the vertical stabilizer root leading edge.

Blue paint transfer marks were observed on the leading edge of the Diamond's right wing. The marks were about 8 inches long and 12 inches from the wing root. The Diamond's landing, taxi, strobe, and position light switches were impact-damaged, and their preimpact positions could not be determined.

Lightweight pieces of the Diamond were found on a northerly path, beginning 340 ft south of the main wreckage. One of the most southerly pieces of wreckage debris was the right half of the Diamond's elevator. Closer examination revealed black transfer markings on the upper surface of the elevator that were consistent in color and tread pattern with the right main landing gear tire of the Beech. Examination of the Diamond's horizontal stabilizer revealed similar transfer markings on its upper surface. The other small pieces of debris located south of the main wreckage were identified as sections of the Diamond's canopy and wing root/fuselage skin.

Medical and Pathological Information

The Beech Pilot

The Georgia Bureau of Investigation Division of Forensic Sciences performed an autopsy of the Beech pilot and the cause of death was blunt trauma of the head and chest, and the manner of death was accident.

The FAA's Bioaeronautical Research Sciences Laboratory, Oklahoma City, Oklahoma, performed toxicology testing and identified doxazosin and losartan in the pilot's blood, and doxazosin, dextromethorphan, and its metabolite dextrorphan in urine. Doxazosin and losartan are blood pressure medications also named Cardura and Cozaar, respectively. The pilot reported the use of doxazosin and losartan to the FAA during his most recent FAA third-class physical. Dextromethorphan is an over-the-counter cough suppressant available in a number of products.

The Diamond Flight Instructor

The Georgia Bureau of Investigation Division of Forensic Sciences performed an autopsy of the Diamond flight instructor and the cause of death was blunt head trauma, and the manner of death was accident.

The FAA's Bioaeronautical Research Sciences Laboratory, Oklahoma City, Oklahoma, performed toxicology testing of the flight instructor. The specimens tested negative for carbon monoxide, ethanol, and a wide range of drugs, including major drugs of abuse.

The Diamond Student Pilot

The Georgia Bureau of Investigation Division of Forensic Sciences performed an autopsy of the Diamond student pilot and the cause of death was blunt trauma of the head and torso, and the manner of death was accident.

The FAA's Bioaeronautical Research Sciences Laboratory, Oklahoma City, Oklahoma, performed toxicology testing of the student pilot. The specimens tested negative for carbon monoxide, ethanol, and a wide range of drugs, including major drugs of abuse.

Tests and Research

The King KX 155 VHF transceiver and the Garmin GNS 530 all-in-one unit from the Beech were sent to the NTSB Vehicle Recorders Laboratory to determine the frequencies in use at the time of the accident. The examination revealed that the KX 155 communication frequencies were set to 118.17 MHz (active) and 126.22 MHz (standby). The GNS 530 communication frequencies were set to 122.7 MHz (active) and 124.050 MHz (standby). The waypoint communications information page for CTJ was accessed during the examination even though the installed GNS 530 aviation database expired as of November 12, 2015. The CTAF/UNICOM on the displayed page showed the correct frequency of 122.975 MHz.

Additional Information

FAA Rules, Regulations, and Guidance to Pilots

Title 14 *CFR* 91.113 addresses aircraft right-of-way rules and states, in part, the following:

(b) General. When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.

(f) Overtaking. Each aircraft that is being overtaken has the right-of-way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.

(g) Landing. Aircraft, while on final approach to land or while landing, have the right-of-way over other aircraft in flight or operating on the surface, except that they shall not take advantage of this rule to force an aircraft off the runway surface which has already landed and is attempting to make way for an aircraft on final approach. When two or more aircraft are approaching an airport to landing, the aircraft at the lower altitude has the right-of-way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land or to overtake that aircraft.

The FAA's Aeronautical Information Manual (AIM), dated December 10, 2015, paragraph 5-5-8, includes pilot procedures for see-and-avoid while in flight and states, "When meteorological conditions permit, regardless of type of flight plan or whether or not under control of a radar facility, the pilot is responsible to see and avoid other traffic, terrain, or obstacles."

The AIM, paragraph 4-1-9, also describes operations to/from airports without an operating control tower and the use of a CTAF and states, in part, the following:

a. Airport Operations Without Operating Control Tower

1. There is no substitute for alertness while in the vicinity of an airport. It is essential that pilots be alert and look for other traffic and exchange traffic information when approaching or departing an airport without an operating control tower…To achieve the greatest degree of safety, it is essential that all radio-equipped aircraft transmit/receive on a common frequency identified for the purpose of airport advisories.

b. Communicating on a Common Frequency

The key to communicating at an airport without an operating control tower is selection of the correct common frequency…A CTAF is a frequency designated for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower.

The AIM describes the recommended communication procedures regarding departure aircraft on the CTAF and states, "Pilots of inbound traffic should monitor and communicate as appropriate on the designated CTAF from 10 miles to landing. Pilots of departing aircraft should monitor/communicate on the appropriate frequency from start-up, during taxi, and until 10 miles from the airport unless the *CFRs* or local procedures require otherwise."

The Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-24A), section 13, addresses scanning procedures for visually acquiring traffic:

The pilot can contribute to collision avoidance by being alert and scanning for other aircraft. This is particularly important in the vicinity of an airport.

The See-and-Avoid Concept

The FAA issued AC 90-48D, "Pilots' Role in Collision Avoidance," in April, 2016 to alert all pilots "…to the potential hazards of midair collisions and near midair collisions (NMAC), and to emphasize those basic problem areas related to the human causal factors where improvements in pilot education,

operating practices, procedures, and improved scanning techniques are needed to reduce midair conflicts."

AC 90-48D stated that each person operating an aircraft, regardless of whether the operation was conducted under IFR or VFR, shall maintain a vigilant lookout for other aircraft at all times. Regarding visual scanning, the AC specifically stated that "Pilots should remain constantly alert to all traffic movement within their field of vision, as well as periodically scanning the entire visual field outside of their aircraft to ensure detection of conflicting traffic.". AC 90-48D also described several specific methods that pilots could use to visually acquire other traffic.

Administrative Information

Investigator In Charge (IIC):	Hicks, Ralph
Additional Participating Persons:	Danny Cox; FAA/FSDO; Atlanta, GA Ricardo Asensio; Textron Aviation; Wichita, KS
Original Publish Date:	December 11, 2017
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93964

Aviation Investigation Final Report

Location:	Carrollton, Georgia	**Accident Number:**	ERA16FA312
Date & Time:	September 7, 2016, 10:48 Local	**Registration:**	N85WP
Aircraft:	DIAMOND AIRCRAFT IND INC DA20	**Aircraft Damage:**	Destroyed
Defining Event:	Midair collision	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The Diamond flight instructor and student pilot were in the traffic pattern at the non-towered airport practicing landings. The Beech pilot entered the traffic pattern on an extended left downwind leg with the intention of landing. Pilots of other airplanes in the pattern reported that the Diamond instructor was making standard traffic pattern callouts on the common traffic advisory frequency (CTAF); however, the Beech pilot was not transmitting on the CTAF. Witness observations, radar data, GPS data, and examination of the wreckage of the two airplanes revealed that, while both airplanes were on final approach for landing, the Beech overtook the Diamond from above and behind. The landing gear of the Beech struck the horizontal stabilizer and elevator of the Diamond, and then both airplanes abruptly descended into the terrain short of the runway. The Beech came to rest inverted and on top of the Diamond. An examination of wreckage of both airplanes did not reveal evidence of any preaccident anomalies or malfunctions.

Testing of the Beech's VHF communications radio revealed that it was set to an old CTAF frequency for the airport that had been changed about 5 years before the accident. A local airport frequency card dated 7 years before the accident that was found in the Beech's cockpit listed the old CTAF frequency that was set in the Beech's radio. Another pilot at a different airport heard the Beech pilot making pattern calls on the incorrect frequency about the time of the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the Beech pilot to see and avoid the Diamond that was in front of and below his airplane on final approach and his use of an incorrect radio communication frequency for the airport.

Findings

Aircraft	VHF communication system - Incorrect use/operation
Personnel issues	Use of equip/system - Pilot of other aircraft
Personnel issues	Use of policy/procedure - Pilot of other aircraft
Personnel issues	Monitoring other aircraft - Pilot of other aircraft

Factual Information

History of Flight

Approach-VFR pattern final	Midair collision
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On September 7, 2016, at 1048 eastern daylight time, a Beech F33A, N6027K, and a Diamond Aircraft Industries DA20-C1, N85WP, collided in midair on the final approach leg of the traffic pattern to runway 35 at West Georgia Regional Airport (CTJ), Carrollton, Georgia. The Beech was substantially damaged, and the private pilot was fatally injured. The Diamond was destroyed, and the flight instructor and the student pilot were fatally injured. The Beech was registered to and operated by the private pilot. The Diamond was registered to and operated by Falcon Aviation Academy LLC. Both flights were conducted under the provisions of 14 *Code of Federal Regulations (CFR)* Part 91; the Beech pilot was conducting a personal flight, and the Diamond pilots were conducting an instructional flight. Visual meteorological conditions prevailed, and no flight plans were filed for either flight. The Beech departed from Fulton County Airport (FTY), Atlanta, Georgia, about 0915, and the Diamond departed from Newnan Coweta County Airport (CCO), Newnan, Georgia, about 1000.

According to personnel from Falcon Aviation Academy, the pilots of the Diamond were practicing traffic pattern operations and landings at CTJ. The Diamond entered the traffic pattern, followed a few minutes later by N263CF and then by N169PS, both Falcon Aviation Academy DA20s. The flight instructor and student pilot on board N263CF saw the Beech on the downwind leg of the traffic pattern. Moments later, the flight instructor and student pilot on board N169PS entered the traffic pattern from the east. They looked down and to the left, in the direction of the final approach path for runway 35, and saw two airplanes collide. The instructors and the students on board both trailing DA20s reported that they did not hear the Beech pilot broadcasting his intentions on the CTJ common traffic advisory frequency (CTAF) but they heard the accident Diamond making position calls in the traffic pattern before the collision, with the last call being made on the final approach.

Another flight instructor employed by Falcon Aviation Academy reported that he was familiar with the Beech pilot and his airplane. He had just completed a flight at CCO and heard the Beech pilot broadcasting traffic pattern calls for CTJ about the time of the accident; however, the Beech pilot was broadcasting over the CCO CTAF of 122.7 MHz. The flight instructor reported that the Beech pilot was not in the traffic pattern at CCO at the time of the transmissions.

Radar data provided by Federal Aviation Administration (FAA) air traffic control personnel indicated that the Beech pilot entered an extended left downwind for CTJ from the north, above and behind the accident Diamond, which was on the downwind leg of the traffic pattern. The ground speed of the Beech was about 50 knots greater than the ground speed of the Diamond. The last radar returns were on the downwind leg, about 2,000 ft above mean sea level, or about 850 ft above the ground. The locations of the last radar returns showed the airplanes approaching the base leg for runway 35.

The Diamond was not equipped with GPS data recording capability. A portable GPS receiver recovered

from the Beech recorded the accident flight. The recording indicated that the Beech was established on the downwind leg for runway 35, about 2,500 ft GPS altitude and 150 knots groundspeed. The CTJ airport elevation was 1,164 ft. The Beech descended toward the base leg, turning base about 2,200 ft and 122 knots. The Beech turned onto final about 1,450 ft and 79 knots. The last recorded data point was at 1048:00, with the Beech at 1,201 ft and 76 knots, about 607 ft south of the runway 35 threshold.

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	24,Female
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	March 17, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 5, 2016
Flight Time:	850 hours (Total, all aircraft), 621 hours (Pilot In Command, all aircraft)		

Student pilot Information

Certificate:	Student	**Age:**	20,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	August 5, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	20 hours (Total, all aircraft)		

The Beech Pilot

The pilot of the Beech, age 79, held an FAA private pilot certificate with airplane single-engine land and instrument airplane ratings. He held an FAA third-class medical certificate with a restriction to have glasses available for near vision. He reported 2,500 total hours of flying experience on his FAA third-class medical certificate application that was dated October 5, 2015. His personal pilot logbook was not located.

According to the owner's representative (insurance adjuster), the Beech pilot reported that he completed a Beechcraft Pilot Proficiency Program on October 30, 2015, at Blairsville, Georgia. This was confirmed verbally and accepted as a current flight review by the insurance company.

The Diamond Flight Instructor

The flight instructor in the Diamond, age 24, held an FAA commercial pilot certificate with ratings for airplane multi-engine land, airplane single-engine land, and instrument airplane. She held an FAA flight instructor certificate with a rating for airplane single-engine, and she held an FAA first-class medical certificate with a restriction to wear glasses. She was seated in the right cockpit seat. She reported 600 total hours of flying experience on her FAA first-class medical certificate application that was dated March 16, 2016. A review of her pilot logbook revealed about 850 hours total time, including 721 hours in single-engine airplanes and 366 hours as a flight instructor.

The Diamond Student Pilot

The student pilot in the Diamond, age 20, held an FAA student pilot certificate. He held an FAA second-class medical certificate with no restrictions. He was seated in the left cockpit seat. He enrolled in the ab initio training program at Falcon Aviation Academy on August 4, 2016, and had logged about 22 hours of flight time.

Aircraft and Owner/Operator Information

Aircraft Make:	DIAMOND AIRCRAFT IND INC	**Registration:**	N85WP
Model/Series:	DA20 C1	**Aircraft Category:**	Airplane
Year of Manufacture:	2005	**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	C0316
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	August 9, 2016 Annual	**Certified Max Gross Wt.:**	1764 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1990 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:		**Engine Model/Series:**	IO-240-B
Registered Owner:	Falcon Aviation Academy LLC	**Rated Power:**	125 Horsepower
Operator:	Falcon Aviation Academy LLC	**Operating Certificate(s) Held:**	Pilot school (141)

Beech

The off-white- and blue/gold-colored Beech F33A was a single-engine, low-wing airplane with a conventional tail. A review of the airplane's maintenance and airworthiness records revealed that an enhanced Whelen light-emitting diode (LED) wingtip position and anti-collision light system, model OR6502GE/OR6502RE, and a Whelen LED tail position and anti-collision light system, model OR5002V, were installed on the airplane per FAA Supplemental Type Certificate, dated November 10, 2014. The airplane was equipped with landing and taxi lights. The airplane was not equipped with a

traffic advisory system (TAS), traffic alert and collision avoidance system (TCAS), or automatic dependent surveillance-broadcast (ADS-B) equipment or displays. The Beech's avionics suite included a King KX 155 VHF communication/navigation transceiver and a Garmin GNS 530 GPS/communication/navigation all-in-one unit.

According to information provided by the owner's representative, the Beech's most recent annual inspection was completed on or about July 13, 2016. At the time of the inspection, the airframe had accumulated about 4,549 total hours of operation.

Diamond

The white- and blue-colored Diamond DA20 was a single-engine, low-wing airplane with a T-tail configuration. It was equipped with wingtip-mounted anti-collision strobe lights and navigation position lights, and a landing and taxi light. The airplane was not equipped with a TAS, TCAS, ADS-B equipment or displays. The Diamond's avionics suite included an iCOM AC-A200 VHF air band transceiver and a Garmin GNS 430 GPS/communication/navigation all-in-one unit.

The Diamond's most recent annual inspection was completed on August 9, 2016. At the time of the inspection, the airframe had accumulated about 1,990 total hours of operation.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CTJ,1165 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	10:55 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 8500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.29 inches Hg	**Temperature/Dew Point:**	30°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Newnan, GA (CCO)	**Type of Flight Plan Filed:**	None
Destination:	Newnan, GA (CCO)	**Type of Clearance:**	None
Departure Time:	10:00 Local	**Type of Airspace:**	Class G

The CTJ 1055 weather observation included wind calm, visibility 10 statute miles, scattered clouds at 8,500 ft, temperature 30°C, dew point 19°C, and an altimeter setting 30.30 inches of mercury.

Airport Information

Airport:	West Georgia Regional CTJ	**Runway Surface Type:**	Asphalt
Airport Elevation:	1164 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	35	**IFR Approach:**	None
Runway Length/Width:	5503 ft / 100 ft	**VFR Approach/Landing:**	Traffic pattern

CTJ was a public, non-towered, uncontrolled airport with a single runway, designated 17/35. The runway was 5,503 ft long and 100 ft wide. The published traffic pattern direction for runway 35 was to the left. Falcon Aviation Academy personnel reported that their pilots frequently used CTJ for training purposes.

The CTAF/UNICOM frequency for CTJ at the time of the accident was 122.975 MHz. CTAF communications were not recorded. The airport manager reported that the CTJ CTAF frequency was changed from 122.7 MHz to 122.975 MHz in 2011.

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	33.623332,-85.149169

General

The main wreckage of both airplanes came to rest in a grass field, about 408 ft south of the approach end of runway 35, on the extended centerline of the runway. The Diamond came to rest in an upright position. The Beech came to rest inverted and on top of the Diamond wreckage. The wreckage debris field was about 350 ft long and about 80 ft wide, oriented on a heading of 350º. All major structural components of both airplanes were accounted for within the wreckage debris field.

Beech

The wreckage of the Beech was generally intact; the wings and empennage remained attached to the fuselage. Flight control cable continuity was established from the cockpit controls to the flight control surfaces. The ailerons, elevator, and rudder remained attached in their respective positions on the wings, horizontal stabilizer, and rudder. Blue-colored paint transfer marks were found on the lower surface of the right wing, near wing station 108. Impact damage with paint transfer was found on the top of the fuselage around station 131.

The nose gear separated from the airplane during the impact sequence. White paint transfer markings were observed on the nose gear tire. The left and right main landing gear were found in the extended positions. White paint transfer markings were observed on the left, main gear tire. The wing flaps were extended 20º.

The master and avionics switches were found in the "on" positions. The strobe light switch was found in the "on" position. The taxi light switch was found in the "on" position, and the landing light was found in the "off" position; however, both switches had impact damage. The position of the navigation light switch could not be determined because of impact damage.

The engine remained attached to the firewall. External examination of the engine did not reveal physical evidence of a mechanical malfunction or anomaly. The propeller assembly separated from the engine at the crankshaft/propeller flange junction. The fracture surfaces exhibited features consistent with overload. The propeller blades remained attached to the hub and displayed chordwise scratches, blade twisting, leading edge gouging, and surface polishing.

A laminated card titled "LOCAL AREA FREQ" and dated April 27, 2009, was found in the Beech's cockpit. The card, which listed the frequencies for multiple airports in the area, listed the frequency for the CTAF at CTJ as 122.7 MHz.

Diamond

The Diamond came to rest upright, under the wreckage of the Beech. Flight control continuity was confirmed from the elevator and rudder to the cockpit controls. Aileron control continuity was confirmed from the right aileron to the cockpit controls. The left wing separated from the fuselage during the impact sequence. The left aileron control tubes had multiple fractures that exhibited overload signatures. The empennage separated from the fuselage about 14 inches forward of the vertical stabilizer root leading edge.

Blue paint transfer marks were observed on the leading edge of the Diamond's right wing. The marks were about 8 inches long and 12 inches from the wing root. The Diamond's landing, taxi, strobe, and position light switches were impact-damaged, and their preimpact positions could not be determined.

Lightweight pieces of the Diamond were found on a northerly path, beginning 340 ft south of the main wreckage. One of the most southerly pieces of wreckage debris was the right half of the Diamond's elevator. Closer examination revealed black transfer markings on the upper surface of the elevator that were consistent in color and tread pattern with the right main landing gear tire of the Beech. Examination of the Diamond's horizontal stabilizer revealed similar transfer markings on its upper surface. The other small pieces of debris located south of the main wreckage were identified as sections of the Diamond's canopy and wing root/fuselage skin.

Medical and Pathological Information

The Beech Pilot

The Georgia Bureau of Investigation Division of Forensic Sciences performed an autopsy of the Beech pilot and the cause of death was blunt trauma of the head and chest, and the manner of death was accident.

The FAA's Bioaeronautical Research Sciences Laboratory, Oklahoma City, Oklahoma, performed toxicology testing and identified doxazosin and losartan in the pilot's blood, and doxazosin, dextromethorphan, and its metabolite dextrorphan in urine. Doxazosin and losartan are blood pressure medications also named Cardura and Cozaar, respectively. The pilot reported the use of doxazosin and losartan to the FAA during his most recent FAA third-class physical. Dextromethorphan is an over-the-counter cough suppressant available in a number of products.

The Diamond Flight Instructor

The Georgia Bureau of Investigation Division of Forensic Sciences performed an autopsy of the Diamond flight instructor and the cause of death was blunt head trauma, and the manner of death was accident.

The FAA's Bioaeronautical Research Sciences Laboratory, Oklahoma City, Oklahoma, performed toxicology testing of the flight instructor. The specimens tested negative for carbon monoxide, ethanol, and a wide range of drugs, including major drugs of abuse.

The Diamond Student Pilot

The Georgia Bureau of Investigation Division of Forensic Sciences performed an autopsy of the Diamond student pilot and the cause of death was blunt trauma of the head and torso, and the manner of death was accident.

The FAA's Bioaeronautical Research Sciences Laboratory, Oklahoma City, Oklahoma, performed toxicology testing of the student pilot. The specimens tested negative for carbon monoxide, ethanol, and a wide range of drugs, including major drugs of abuse.

Tests and Research

The King KX 155 VHF transceiver and the Garmin GNS 530 all-in-one unit from the Beech were sent to the NTSB Vehicle Recorders Laboratory to determine the frequencies in use at the time of the accident. The examination revealed that the KX 155 communication frequencies were set to 118.17 MHz (active) and 126.22 MHz (standby). The GNS 530 communication frequencies were set to 122.7 MHz (active) and 124.050 MHz (standby). The waypoint communications information page for CTJ was accessed during the examination even though the installed GNS 530 aviation database expired as of November 12, 2015. The CTAF/UNICOM on the displayed page showed the correct frequency of 122.975 MHz.

Additional Information

FAA Rules, Regulations, and Guidance to Pilots

Title 14 *CFR* 91.113 addresses aircraft right-of-way rules and states, in part, the following:

(b) General. When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.

(f) Overtaking. Each aircraft that is being overtaken has the right-of-way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.

(g) Landing. Aircraft, while on final approach to land or while landing, have the right-of-way over other aircraft in flight or operating on the surface, except that they shall not take advantage of this rule to force an aircraft off the runway surface which has already landed and is attempting to make way for an aircraft on final approach. When two or more aircraft are approaching an airport to landing, the aircraft at the lower altitude has the right-of-way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land or to overtake that aircraft.

The FAA's Aeronautical Information Manual (AIM), dated December 10, 2015, paragraph 5-5-8, includes pilot procedures for see-and-avoid while in flight and states, "When meteorological conditions permit, regardless of type of flight plan or whether or not under control of a radar facility, the pilot is responsible to see and avoid other traffic, terrain, or obstacles."

The AIM, paragraph 4-1-9, also describes operations to/from airports without an operating control tower and the use of a CTAF and states, in part, the following:

a. Airport Operations Without Operating Control Tower

1. There is no substitute for alertness while in the vicinity of an airport. It is essential that pilots be alert and look for other traffic and exchange traffic information when approaching or departing an airport without an operating control tower…To achieve the greatest degree of safety, it is essential that all radio-equipped aircraft transmit/receive on a common frequency identified for the purpose of airport advisories.

b. Communicating on a Common Frequency

The key to communicating at an airport without an operating control tower is selection of the correct common frequency…A CTAF is a frequency designated for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower.

The AIM describes the recommended communication procedures regarding departure aircraft on the

CTAF and states, "Pilots of inbound traffic should monitor and communicate as appropriate on the designated CTAF from 10 miles to landing. Pilots of departing aircraft should monitor/communicate on the appropriate frequency from start-up, during taxi, and until 10 miles from the airport unless the *CFRs* or local procedures require otherwise."

The Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-24A), section 13, addresses scanning procedures for visually acquiring traffic:

The pilot can contribute to collision avoidance by being alert and scanning for other aircraft. This is particularly important in the vicinity of an airport.

The See-and-Avoid Concept

The FAA issued AC 90-48D, "Pilots' Role in Collision Avoidance," in April, 2016 to alert all pilots "…to the potential hazards of midair collisions and near midair collisions (NMAC), and to emphasize those basic problem areas related to the human causal factors where improvements in pilot education, operating practices, procedures, and improved scanning techniques are needed to reduce midair conflicts."

AC 90-48D stated that each person operating an aircraft, regardless of whether the operation was conducted under IFR or VFR, shall maintain a vigilant lookout for other aircraft at all times. Regarding visual scanning, the AC specifically stated that "Pilots should remain constantly alert to all traffic movement within their field of vision, as well as periodically scanning the entire visual field outside of their aircraft to ensure detection of conflicting traffic.". AC 90-48D also described several specific methods that pilots could use to visually acquire other traffic.

Administrative Information

Investigator In Charge (IIC):	Hicks, Ralph
Additional Participating Persons:	Danny Cox; FAA/FSDO; Atlanta, GA Ricardo Asensio; Textron Aviation; Wichita, KS
Original Publish Date:	December 11, 2017
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93964