Aviation Investigation Final Report

Location:	Camden, South Carolina	**Accident Number:**	ERA11LA330
Date & Time:	May 27, 2011, 15:15 Local	**Registration:**	N291CC
Aircraft:	Beech C90	**Aircraft Damage:**	Substantial
Defining Event:	Turbulence encounter	**Injuries:**	5 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot obtained weather information via the internet before the flight. The information he obtained included advisories for convective activity and scattered thunderstorms along the intended northwesterly route of flight. The pilot reported that the takeoff and the climb to cruise altitude were "normal," with intermittent periods of light turbulence. About 100 miles northwest of the departure airport, the pilot observed weather ahead on the airplane's on-board weather radar and requested from the en route air traffic controller a 45-degree westerly course deviation. A course deviation was granted, but because of a potential conflict with a climbing airplane, the pilot was instructed to turn no more than 30 degrees west of his previously established heading. After turning the airplane 30 degrees, the pilot determined that he would need an additional 30- to 45-degree course deviation to avoid weather ahead. The pilot made at least two additional attempts to contact the controller, but received no response. Postaccident review of air traffic control recordings indicates that the pilot's transmissions were likely blocked, as one of them was made while another pilot was transmitting and the other was made while the controller was speaking to yet another pilot. The pilot made an additional course deviation, and the airplane encountered moderate to severe turbulence lasting about 2 minutes; however, the airplane performed normally after the turbulence encounter and the pilot continued to the destination airport, landing without further incident. Subsequent examination of the airplane revealed substantial damage to the wing spar, likely due to the turbulence encounter.

The airplane was equipped with a next generation radar receiver, weather radar, and a lightning strike indicator. The pilot was thus likely aware of areas of significant weather ahead of him, as well as the less significant weather to the northeast and south well before the encounter, and he was definitely aware of the clear weather through which he had just flown. Nonetheless, the pilot continued to fly toward his destination, and toward the significant

weather, which resulted in the airplane's encounter with the turbulence.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's in-flight decision to continue toward his destination, through known significant weather, when safer alternatives were available.

Findings

Personnel issues	Decision making/judgment - Pilot
Environmental issues	Thunderstorm - Decision related to condition
Environmental issues	Convective turbulence - Effect on equipment

Factual Information

History of Flight

Enroute-cruise	Turbulence encounter (Defining event)
Enroute-cruise	Windshear or thunderstorm

HISTORY OF FLIGHT

On May 27, 2011, about 1515 eastern daylight time, a Beechcraft C90, N291CC, was substantially damaged during an encounter with severe turbulence at an altitude of 20,000 feet approximately 10 miles north of Woodward Airport (CDN), Camden, South Carolina. The airline transport pilot and four passengers were not injured. Instrument meteorological conditions prevailed, and the airplane was operating on an instrument flight rules flight plan from Charleston International Airport (CHS), Charleston, South Carolina, to Newark-Heath Airport (VTA), Newark, Ohio. The personal flight was operated under the provisions of 14 Code of Federal Regulations Part 91.

According to the pilot, he obtained weather information via the internet prior to the flight, which included advisories for convective activity and scattered thunderstorms along the intended [northwest] route of flight. The takeoff from CHS and the climb to cruise altitude were "normal," with intermittent periods of light turbulence.

The pilot also stated that about 100 miles northwest of CHS, he observed weather ahead on the airplane's on-board weather radar and requested a course deviation from the en route air traffic controller. The deviation was granted, but the pilot was instructed to turn no more than 30 degrees west of his previously established heading. After turning the 30 degrees, the pilot realized that he would require an additional 30- to 45-degree course deviation to avoid the weather ahead. The pilot stated that he attempted to contact the controller three times, and after receiving no response, elected to turn further to the west. The airplane then encountered moderate to severe turbulence lasting about 2 minutes and an approximately 300-foot deviation in altitude.

The pilot also stated that after the encounter, the airplane performed normally with no observed anomalies, so he elected to continue to the destination. His postflight visual inspection of the airplane revealed no damage, and he flew the airplane back to CHS the following day. Subsequent closer inspection of the airplane revealed wing spar damage at the fuselage attach point, as well as wrinkling of the wing skin.

A review of air traffic control voice communications (tapes and transcripts) revealed that the pilot established contact with Jacksonville Center at 1449. At that time, the pilot reported that the airplane was climbing through 7,000 feet for 8,000 feet and experiencing "light chop." The

controller then cleared the airplane to climb and maintain an altitude of 15,000 feet.

At 1450, the controller asked the pilot about his routing, which he noted would take the airplane through the center of scattered areas of moderate to extreme precipitation, beginning 20 miles at 10 o'clock, scattered along the route for 100 miles. The pilot responded, "that's exactly what I'm looking at, [it] looks pretty good right now; believe we can get through it." The controller then advised the pilot to let him know if he needed to deviate.

At 1454, the pilot was cleared to climb the airplane to flight level 200.

At 1507:26, the pilot called the controller, who responded that the call was unreadable.

At 1507:37, the pilot requested a course deviation "about 45 degrees to the left" to avoid weather. The controller cleared the airplane to deviate up to 30 degrees left of the established course, and to proceed direct to VTA when able.

According to the controller, and as confirmed by radar, only 30 degrees was approved due to a commercial airliner climbing west of the accident airplane's position.

Multiple radio calls from multiple aircraft were then made, many indiscernible, regarding deviations for weather.

About 1508:40, an unidentified voice stated, "…further left for weather."

At 1510:56, the pilot attempted to contact the controller while the pilot of another airplane was reading back a clearance.

At 1511:15, a voice similar to the pilot's attempted to contact the controller while the controller was issuing instructions to another airplane.

At 1511:39, the pilot again contacted ATC, and stated that he was "getting beat up pretty good," and requested to deviate further left of course. The controller reported an opening in the weather about 11 miles from the airplane's position, and suggested a heading of 350 degrees to exit the weather. When queried about the ride conditions, the pilot reported "moderate to severe" turbulence approximately 3 minutes prior, but that the airplane was experiencing "light to moderate" turbulence at the time.

At 1514:11, the controller stated that it appeared that the airplane was exiting the extreme precipitation and the pilot concurred. When the controller asked if the airplane had sustained damage or if any passengers had been injured as a result of the turbulence encounter, the pilot replied that everything was "okay."

At 1515:55, the pilot reported that the airplane was "in the clear." The controller stated that the pilot should not hesitate to make a precautionary landing should he suspect structural damage

to the airplane, then instructed the pilot to contact Atlanta Center.

PERSONNEL INFORMATION

The pilot held an airline transport pilot certificate with ratings for airplane single engine land and sea, and multiengine land; as well as a flight instructor certificate with ratings for airplane single- and multiengine land and instrument airplane.

The pilot reported 14,500 total hours of flight experience, of which, 2,200 hours were in the accident airplane make and model. His most recent flight review was conducted in February 2011.

AIRCRAFT INFORMATION

According to FAA records, the airplane was manufactured in 1977, and was powered by two Pratt & Whitney PT-6 turboprop engines. The airplane's most recent continuous airworthiness program inspection was conducted on April 27, 2011, at which time the airframe had accrued a total time of 10,423 hours.

In addition to weather radar, the airplane was equipped with a multifunction display that provided Next Generation Radar (NEXRAD) weather information received from a commercial satellite weather service and a stormscope real-time lightning detection system.

METEOROLOGICAL INFORMATION

According to an NTSB Weather Study, the 1515 weather observation at CDN included winds from 320 degrees at 9 knots with gusts to 39 knots, one-half mile statute visbility in rain and thunderstorms, a broken cloud layer at 300 feet above ground level (agl), overcast clouds at 3,600 feet agl, temperature 23 degrees C, dew point 20 degrees C, and an altimeter setting of 29.87 inches of mercury. The report also contained remarks for distant lightning to the east and west of the airport.

There was also an active SIGMET at the time of the accident for much of the southeastern United States, including the accident area. The SIGMET advised of severe thunderstorms moving from 220 degrees at 20 knots with cloud tops above flight level 450.

At 1210, the Storm Prediction Center issued a Severe Thunderstorm Watch covering North Carolina, central South Carolina and southern Virginia that was active at the time of the accident. It forecasted severe thunderstorms with hail aloft up to 1.5 inches in diameter with extreme turbulence and surface wind gusts up to 60 knots likely.

The Study also included a stationary base reflectivity image with radar track overlay that indicated that the airplane was headed northwest, and entered moderate precipitation by 1510. (Because the image was stationary, but the thunderstorms were moving northeast, positions

as plotted may be displaced from actual positions.)

At the time of initial precipitation contact, an area from the airplane's immediate northwest to the immediate southwest exhibited reflectivity consistent with "intense" or "extreme" precipitation as defined by FAA Advisory Circular AC 00-24B, with cloud tops reaching 36,000 feet. There were also areas of lightning to the southwest and west.

At radar plot time 1511, the airplane altered track about 30 degrees to the left, and just after that, entered the intense precipitation. By 1512, the airplane was in the middle of the intense precipitation, and it then altered course to the left by about another 30 degrees. By 1513, the airplane had cleared the intense precipitation, and altered course about 45 degrees to the right, back toward its destination.

Both the radar and NEXRAD also revealed areas with less precipitation to the northeast and south when the airplane penetrated weather to west. They also showed no precipitation to the southeast, from where the airplane had come.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	72,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	July 16, 2010
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 16, 2011
Flight Time:	14500 hours (Total, all aircraft), 2200 hours (Total, this make and model), 13500 hours (Pilot In Command, all aircraft), 125 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N291CC
Model/Series:	C90	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	LJ-728
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	April 27, 2011 Continuous airworthiness	**Certified Max Gross Wt.:**	10500 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo prop
Airframe Total Time:	10423 Hrs as of last inspection	**Engine Manufacturer:**	P&W CANADA
ELT:	Installed, not activated	**Engine Model/Series:**	PT6A-135A
Registered Owner:	LP AVIATION LLC	**Rated Power:**	1050 Horsepower
Operator:	LP AVIATION LLC	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CDN,302 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	15:15 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	0 miles
Lowest Ceiling:	Broken / 300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / 39 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	320°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.87 inches Hg	**Temperature/Dew Point:**	23°C / 20°C
Precipitation and Obscuration:	N/A - Thunderstorm - Rain		
Departure Point:	Charleston, SC (CHS)	**Type of Flight Plan Filed:**	IFR
Destination:	Newark, OH (VTA)	**Type of Clearance:**	IFR
Departure Time:	14:45 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	4 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	5 None	**Latitude, Longitude:**	34.260158,-80.610916(est)

Administrative Information

Investigator In Charge (IIC):	Cox, Paul
Additional Participating Persons:	Steven Petrossian; FAA/FSDO; Columbia, SC
Original Publish Date:	January 22, 2013
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=80717