



National Transportation Safety Board Aviation Accident Factual Report

Location:	Erwin, TN	Accident Number:	ERA16FA006
Date & Time:	10/09/2015, 1919 EDT	Registration:	N1058S
Aircraft:	COLUMBIA AIRCRAFT MFG LC41 550FG	Aircraft Damage:	Destroyed
Defining Event:	Windshear or thunderstorm	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

On October 9, 2015, about 1919 eastern daylight time, a Columbia Aircraft Manufacturing LC41-550FG, N1058S, impacted the ground in an uncontrolled descent after encountering a thunderstorm near Erwin, Tennessee. The private pilot and the passenger were fatally injured, and the airplane was destroyed. The airplane was owned and operated by the pilot. The personal flight was conducted under the provisions of 14 *Code of Federal Regulations* Part 91. The flight originated from the Tyson Airport (TYS) Knoxville, Tennessee, about 1830 and had an intended destination of Monroe County Airport (BMG), Bloomington, Indiana. Night visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan had been filed.

The flight originated earlier in the day from the Kissimmee Gateway Airport (ISM), Orlando, Florida. Prior to departing ISM, the pilot's login credentials were used to access weather information via DUAT (Direct User Access Terminal). The information provided included weather along the planned route of flight in textual form. The terminal area forecasts along the route of flight predicted showers and thunderstorms in the TYS area and north beginning about 1700. The weather report also included a "Severe Weather Outlook," which stated in part "There is a marginal risk of severe thunderstorm from southern New England to the Tennessee Valley. Scattered thunderstorms should occur today in a corridor from New York and parts of New England southwestward to the Tennessee Valley region. A few of these storms may produce damaging gusts near severe limits and a tornado cannot be ruled out over the northeast."

While en route, the pilot diverted to TYS as he wanted to "check the weather." The flight landed at TYS about 1745. DUAT records indicated that about 1750 the pilot's login credentials were used to access the system and obtain a weather briefing. The weather briefing included a textual description of weather reports along the intended route of flight, and spanning as far as Florida and the New England area. About 1830, the airplane departed TYS and was observed on radar climbing to 15,000 ft mean sea level (msl) on an easterly heading, paralleling an east-west line of convective weather to the north. During the flight, the pilot was in communication with air traffic control (ATC) personnel.

At 1836:02 the TYS controller contacted an air carrier flight descending into TYS and stated in part, "...i got a Columbia that's trying to get towards uh Bloomington Indiana uh would you say going up to like sixteen thousand uh would be a good idea through that area or should i take him somewhere else."

At 1836:13 the air carrier flight stated "absolutely no he needs to go somewhere else."

At 1836:21 the accident flight acknowledged the transmission.

At 1836:21 the controller stated in part "...if i take you to the north i got some areas of uh some lighter precipitation off to the north uh i can get you that way you might be able to cut through that way would you want to try that."

At 1836:37 the controller then stated "that's gonna be my lightest areas i have a few areas of heavy precipitation but it's more scattered and not as uh well us interconnect as the stuff down here towards the uh southwest..."

For the next approximate 9 minutes the controller provided clearances for the accident pilot to deviate and turn left and/or right as necessary.

At 1845:10 the controller, in communication with another ATC facility stated in part "...he's trying to get through this line that we told him he really shouldn't even have departed cause he can't get through the line."

For the next approximate 9 minutes the controller provided deviation clearances and radio frequency change for the accident flight.

At 1854:28 the controller stated "...based on the weather i'm showing um do you have any uh nexrad or anything on board."

At 1854:36 the pilot replied "i do have nexrad on board"

At 1854:41 the controller stated "...just trying to come up with a plan for you here looks like ah right around well let me see here about your ah eleven o'clock position and about forty miles forty one forty two miles um there's an area if you kinda cut north from there looks like you may be able to hang back towards the northwest its (unintelligible) precip that i'm showing but ah just keep me advised as to what youd like to do."

At 1855:08 the pilot replied "yeah i think we're looking at the same spot i was looking at either just west or just east of ah is it Greenville."

At 1911:09 the pilot requested and received clearance to turn 15° to the left.

At 1913:46 the pilot was given permission and acknowledged the clearance to climb from 15,000 ft msl to 17,000 ft msl.

At 1918:29 the pilot stated "five eight sierra", which was the last recorded transmission from the accident flight.

After the last radio transmission, radar data showed the airplane descending from approximately 17,500 ft to ground level, in approximately one minute, in the vicinity of the accident location.

Multiple witnesses observed the airplane descending, turning to the right, and then exploding on ground impact. One witness reported that, at the time of the accident, the area was receiving a "hard rain."

Pilot Information

Certificate:	Private	Age:	45
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
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:	04/18/2014
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	279 hours (Total, all aircraft)		

According to Federal Aviation Administration (FAA) records, the pilot, age 45, held a private pilot certificate with airplane single-engine land and instrument airplane ratings, which was issued December 28, 2013. He held an FAA third-class medical certificate, issued April 18, 2014, with a limitation that he "must wear corrective lenses." At the time of the medical examination, the pilot reported 279 total hours of flight experience with 73.9 hours in the previous 6 months. At the time of this writing, no pilot logbooks were provided to the.

Aircraft and Owner/Operator Information

Aircraft Make:	COLUMBIA AIRCRAFT MFG	Registration:	N1058S
Model/Series:	LC41 550FG 550FG	Aircraft Category:	Airplane
Year of Manufacture:	2007	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	41722
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	04/15/2015, Annual	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	1113.1 Hours as of last inspection	Engine Manufacturer:	Continental Motors
ELT:	Installed, activated, did not aid in locating accident	Engine Model/Series:	TSIO_550-C20B
Registered Owner:	On file	Rated Power:	310 hp
Operator:	On file	Operating Certificate(s) Held:	None

According to FAA records, the airplane was issued an airworthiness certificate in 2007 and registered to the pilot in January 2015. The most recent recorded annual inspection was on April 15, 2015, and, at that time, the airplane had 1,098.7 total flight hours. The most recent maintenance was recorded on June 24, 2015, and, at that time, the airplane had 1,113.1 total flight hours.

The airplane was powered by a Continental Motors TSIO-550-C20B engine that, at the time of the airplane's most recent annual inspection, had accrued 37.5 flight hours since major overhaul. The most recent engine maintenance occurred on August 17, 2015, which was an oil change; at that time the engine had accrued 76.3 hours since major overhaul.

The airplane was not equipped with on-board weather radar; however, it was equipped to receive XM Satellite Weather. The airplane was also equipped with a Garmin G1000 avionics suite, which was capable of displaying the aviation weather data provided through Sirius XM Satellite Weather services. According to information provided by Sirius XM Satellite Radio, the pilot had established an account for aviator pro aviation weather and Sirius XM Select audio services on July 6, 2011, and the account was current at the time of the accident.

According to Sirius' website the aviator pro service provided the following products: High-Resolution NEXRAD Radar, High-Resolution Radar, Severe Weather Storm Tracks, Lightning, Winds Aloft (at Altitude) SPC Aviation Weather Watches, PIREPs, METARs, TAFs, Turbulence, Satellite Mosaic, AIRMETs, SIGMETs, as well as various other aviation weather services.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night
Observation Facility, Elevation:	KTRI, 1525 ft msl	Distance from Accident Site:	16 Nautical Miles
Observation Time:	1937 EDT	Direction from Accident Site:	355°
Lowest Cloud Condition:	Scattered / 2300 ft agl	Visibility	6 Miles
Lowest Ceiling:	Broken / 6000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/ Convective
Wind Direction:	Variable	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.05 inches Hg	Temperature/Dew Point:	19°C / 17°C
Precipitation and Obscuration:	Heavy - In the Vicinity - Thunderstorms - Rain		
Departure Point:	KNOXVILLE, TN (TYS)	Type of Flight Plan Filed:	IFR
Destination:	BLOOMINGTON, IN (BMG)	Type of Clearance:	IFR
Departure Time:	1830 EDT	Type of Airspace:	Class E

The 1937 special recorded weather observation at Tri-Cities Regional Airport (TRI), Bristol, Tennessee, located about 13 miles to the northwest of the accident location, included variable wind at 3 knots, visibility 6 miles due to thunderstorms and rain, scattered cumulonimbus clouds at 2,300 ft above ground level (agl), broken at 6,000 feet agl, overcast at 11,000 feet agl, temperature 19°C, dew point 17°C, and barometric altimeter 30.05 inches of mercury. The remarks section of the special weather observation stated that a thunderstorm began at 1931 with occasional lighting in cloud and cloud to ground at the airport. The thunderstorms in the vicinity were moving east.

The 1915 recorded weather observation at Elizabethton Airport (0A9), Elizabethton, Tennessee, located about 10 miles to the northeast of the accident location, included calm winds, 10 miles visibility, few clouds at 6,000 feet agl, scattered clouds at 7,500 feet agl, broken clouds at 9,000 feet agl, and barometric altimeter 30.03 inches of mercury.

Weather radar data indicated that the line of convectively contained cells from 5 dBZ (decibels of equivalent reflectivity) to greater than 55dBZ, and the weather cell around the time and vicinity of the accident indicated greater than 55 dBZ.

At 1855, a convective SIGMET was issued advising of a line of thunderstorms 50 miles wide along a line that went through the accident region. The line was reported to be moving from 260° at 30 knots, with cloud tops to FL440 (44,000 feet msl).

Lightning data between 1900 and the time of the accident for the area surrounding the accident location showed lightning activity in the area; however, there was no lightning activity associated with the cell that coincided with the location of the airplane at the time of the accident.

Figure 1: KRMX Reflectivity Product initiated at 1915, White Line was Accident Flight Path at 1917

Geostationary Operational Environmental Satellite (GOES)-13 infrared cloud-top temperatures varied between about -20°C and -53°C in the accident region, corresponding to heights of about 22,600 ft msl and greater than 35,000 ft msl, respectively.

According to the United States Naval Observatory, official sunset was at 1902, and the end of civil twilight was at 1923. Moonset occurred at 1725, and 10% of the moon disc would have been visible had the moon been above the horizon.

WRECKAGE AND IMPACT INFORMATION

The airplane wreckage was found in the Cherokee National Forest, in the vicinity of the accident flight's last radar return, at an elevation of 2,825 ft msl. The slope around the accident site varied between 20° and 30° . The airplane impacted two 27-ft-tall trees. The debris path was fairly compact, and a considerable amount of debris was located within an impact crater that was about the length of the airplane's wingspan. The airframe was impact-damaged, segmented, and thermally destroyed. The engine was found in a 4-ft-deep crater and remained attached to the firewall. The engine mounts were impact-separated and were located with the main wreckage. The propeller was impact-separated at the crankshaft propeller flange.

The attitude indicator was located within the debris field; it exhibited impact damage and displayed a nose-down, inverted right-wing-low attitude. No other instruments were readable. The nose landing gear wheel was impact-separated and located about 45 ft downhill from the main wreckage. The nose landing gear strut was impacted-separated and was located in the impact crater. The main wing spar was located in the impact crater. It was composed of composite material, was thermally destroyed, and exhibited some impact splintering.

Left Wing

The left wing was thermally destroyed. The left wing navigation light was located at one end of the impact crater. The left wing speed brake was found in the stowed position. The left main wheel assembly was impact-separated. The aileron and flap were thermally destroyed, and an accurate flap position could not be conclusively determined.

Right Wing

The right wing was thermally destroyed. The right wing navigation light was located at the opposite end of the impact crater from the left wing navigation light. The right wing speed brake was found in the stowed position. The right main wheel assembly was thermally destroyed. The aileron and flap were thermally destroyed, and an accurate flap position could not be conclusively determined.

Empennage

The empennage assembly, which included the vertical and horizontal stabilizers, was thermally damaged. The rudder remained attached to the vertical stabilizer but exhibited thermal damage on its leading edge. The rudder cables remained attached to their respective rudder horns.

Engine

The engine remained attached to the firewall, which had become impact separated from the airframe. The engine was an TSIO-550- C, 310-hp. The propeller was separated at the propeller flange. The No. 6 cylinder was impact separated from the engine. The oil pan was thermally damaged. The camshaft was visible, and all of the connecting rods were visible and remained attached to the crankshaft. The crankshaft exhibited torsional twist, 45° lip faces, and radial cracking.

The fuel pump was thermally destroyed. The fuel manifold valve was impact separated; it was disassembled and found to contain soot and debris but was otherwise unremarkable. The magnetos were impact separated, fragmented, and thermally destroyed. The oil pump was impact damaged.

Propeller

The Hartzell 3-bladed propeller was impact separated at the propeller crankshaft flange. The spinner was located within the impact crater, exhibited extensive torsional twisting, and was fragmented. All three blades remained attached. Two of the blade tips were impact separated, one about 31 inches from the hub and the other about 31 1/8 inches from the hub. The third blade was intact. All 3 propeller blades were bent aft and formed around the hub. All 3 blades also exhibited leading edge gouging and slight twisting, and the outboard edge of 2 of the blades exhibited forward bending. The damage to the propeller assembly was consistent with it being under power at the time of impact.

MEDICAL AND PATHOLOGICAL INFORMATION

The Quillen College of Medicine, East Tennessee State University, Division of Forensic Pathology, performed an autopsy on the pilot. The report listed the cause of death as "multiple blunt force injuries."

Toxicological testing on the pilot's muscle tissue was performed at the FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma.

The FAA Bioaeronautical Research Sciences Laboratory toxicology testing was limited by the absence of available blood or body fluids; only muscle tissue was available. Testing detected 0.01 g/dl of ethanol as well as citalopram and its metabolite N-desmethylocitalopram in muscle.

According to the FAA, ethanol is a powerful central nervous system depressant that distributes evenly throughout tissues based on the water content of that tissue. In the United States, a blood level of 0.08 g/dl is considered impairing, and current laws prohibit operating a motor

vehicle at this level but impairment has been documented at levels as low as 0.02 g/dl. Ethanol may also be produced in the body after death by microbial activity.

Citalopram is a prescription antidepressant also named Celexa. The pilot's medical records documented that the pilot's depression had improved significantly on citalopram, and his personal physician noted on the last visit on July 14, 2015, the pilot was doing well on medication, had no significant depressive symptoms, no difficulty concentrating, and no suicidal thoughts or wishes. According to the FAA's Guide for Aviation Medical Examiners, pilots treated for depression with citalopram may be considered for special issuance of a medical certificate if the pilot has been clinically stable as well as on a stable dose of medication without any aeromedically significant side effects and/or an increase in symptoms. For further information, reference the NTSB Medical Officer's Factual Report in the public docket for with this investigation.

ADDITIONAL INFORMATION

The FAA publication "General Aviation Pilot's Guide to Preflight Weather Planning, Weather Self-Briefings, and Weather Decision Making" states, in part: "Datalink does not provide real-time information. Although weather and other navigation displays can give pilots an unprecedented quantity of high quality weather data, their use is safe and appropriate only for strategic decision making (attempting to avoid the hazard altogether). Datalink is not accurate enough or current enough to be safely used for tactical decision making (negotiating a path through a weather hazard area, such as a broken line of thunderstorms). Be aware that onboard weather equipment can inappropriately influence your decision to continue a flight. No matter how "thin" a line of storms appears to be, or how many "holes" you think you see on the display, it is not safe to fly through them."

The FAA's Pilot Handbook of Aeronautical Knowledge, Chapter 10, "Weather Theory" states, in part: "...if an aircraft enters a thunderstorm, the aircraft could experience updraft and downdraft that exceed 3,000 feet per minute...a good rule of thumb is to circumnavigate thunderstorms by at least 5 nautical miles...if flying around a thunderstorm is not an option, stay on the ground until it passes."

FAA Advisory Circular (AC) 00-24, "Thunderstorms," dated February 19, 2013, Section 8, "Ground-Based Weather Radar" states the following with regard to "Echo Intensity (Reflectivity);"

The colors on radar images represent different echo intensities (also called reflectivity) measured in decibels of Z (dBZ) (equivalent reflectivity). The dBZ values increase based on the strength of the return signal from targets in the atmosphere. Each image includes a color scale that represents a correlation between intensity value and color on the radar image...Reflectivity is correlated to intensity of precipitation. When the dBZ value reaches 15, light precipitation is present. The higher the reflectivity value, the higher the rainfall rate. Reflectivity is also correlated with intensity terminology (phraseology) for air traffic control purposes..." Figure 2 shows the correlation between reflectivity and ATC terminology.

Figure 2: ATC Phraseology Chart

Radar dBZ Scale

Review of WSR-88D Level-II weather radar imagery from Knoxville, Tennessee, showed that the color scale used by that system used 16 various colors and shades of colors. The color scale is shown in Figure 3:

Figure 3: WSR-88D Level II Color Scale

Review of the XM satellite reflectivity color bar showed that XM used 7 different colors to display weather radar echo intensities. The color scale was coded from "light" to "heavy" as shown in Figure 4:

Figure 4: XM Satellite Reflectivity Color Scale

Review of the color bar used in the Garmin G1000 for display of XM weather radar imagery showed that it used 6 different colors to display weather radar echo intensities. The color scale was coded as shown in Figure 5.

Figure 5: Garmin G1000 Reflectivity Color Scale

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	On-Ground
Total Injuries:	2 Fatal	Latitude, Longitude:	36.210000, -82.375000

Administrative Information

Investigator In Charge (IIC):	Shawn Etcher
Additional Participating Persons:	Jim Ruckman; FAA/FSDO; Nashville, TN Ernest Hall; Textron Aviation; Wichita, KS Chris N Lang; CMI; Mobile, AL
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=92148