



# Aviation Investigation Final Report

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<b>Location:</b>	Defiance, Missouri	<b>Accident Number:</b>	CEN22FA096
<b>Date &amp; Time:</b>	January 8, 2022, 19:19 Local	<b>Registration:</b>	N585CK
<b>Aircraft:</b>	Beech 58	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Positioning		

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## Analysis

The commercial pilots departed during night, instrument conditions on a positioning flight. After leveling off at 8,000 ft mean sea level with moderate turbulence conditions likely, the airplane slowly turned left from a west to southeast heading. The airplane continued turning left and entered a rapid descent until terrain impact. The airplane was destroyed when it impacted terrain.

Examination revealed no preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation.

Although the pilot and copilot were both instrument current, their flying experience predominantly involved visual flight rules operations. The pilot in command (PIC) did not have the required experience to operate as PIC on Part 135 flights and was the PIC of this Part 91 positioning flight to gain experience. Immediately before the accident flight, the pilot communicated to her boyfriend that she had concerns about the flight due to the weather, along with her and the copilot’s instrument flying skills.

The pilot likely became spatially disoriented during night instrument conditions that included moderate turbulence. Because of the airplane’s single set of flight instruments and “throwover yoke” control column, which required pulling a T-handle latch on the back of the control arm to change the yoke from one side of the cockpit to the other, the copilot likely wasn’t able to assume control of the airplane. As a result, the copilot wasn’t able to recover control of the airplane from its unusual attitude before impact with terrain.

## Probable Cause and Findings

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

The pilot's loss of airplane control while flying in night instrument conditions due to spatial disorientation and the flight crew's inability to recover from an unusual airplane attitude.

### Findings

<b>Personnel issues</b>	Aircraft control - Pilot
<b>Aircraft</b>	(general) - Not attained/maintained
<b>Environmental issues</b>	Dark - Contributed to outcome
<b>Environmental issues</b>	(general) - Contributed to outcome
<b>Environmental issues</b>	(general) - Contributed to outcome

## Factual Information

### History of Flight

<b>Enroute-cruise</b>	Loss of control in flight (Defining event)
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On January 8, 2022, about 1919 central standard time, a Beech B58 airplane, N585CK, was destroyed when it was involved in an accident near Defiance, Missouri. The two commercial pilots sustained fatal injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 positioning flight.

About 1859, the accident flight contacted the air traffic control (ATC) ground controller at Spirit of St. Louis Airport (SUS), Chesterfield, Missouri, and received an instrument flight rules (IFR) clearance to Centennial Airport (APA), Denver, Colorado. About 1901, the ATC ground controller issued taxi instructions to runway 26L and about 1908, the flight received takeoff clearance and was instructed to turn right after takeoff to a heading of 310°.

According to automatic dependent surveillance-broadcast (ADS-B) data, the airplane departed SUS at 1910. After leveling off at 8,000 ft mean sea level (msl) while on a westerly heading, the airplane made a gradual left turn toward the southeast. The airplane continued turning left and descended rapidly.

The controller queried about the airplane's incorrect altitude and direction of flight. A jumbled radio transmission was made by the copilot and no distress call was received. During the final 10 seconds of captured ADS-B data, the airplane descended from 7,500 to 4,700 ft msl.

The airplane impacted forested terrain about 0.40-mile northwest of the last recorded ADS-B data (see figure 1). Two surveillance systems located less than 1 mile from the accident site recorded audio of an airplane with engine noise increasing and the ground impact.

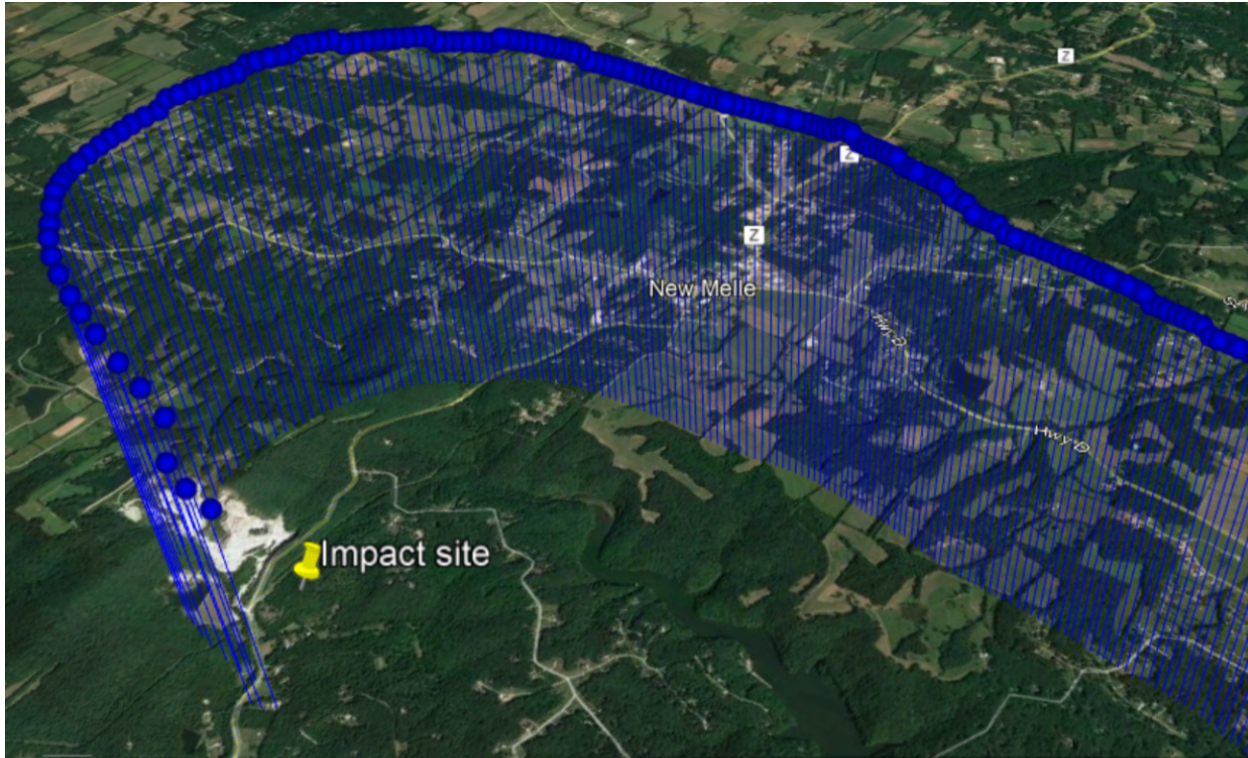


Figure 1. ADS-B Data and Impact Site

### Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	35,Female
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	Unmanned (sUAS)	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane single-engine	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	June 8, 2021
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	November 17, 2021
<b>Flight Time:</b>	1274 hours (Total, all aircraft), 54 hours (Total, this make and model), 1142 hours (Pilot In Command, all aircraft), 54 hours (Last 90 days, all aircraft), 36 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

## Co-pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	55, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Unmanned (sUAS)	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>		<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	October 4, 2021
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	December 1, 2021
<b>Flight Time:</b>	7697 hours (Total, all aircraft), 60 hours (Total, this make and model), 6697 hours (Pilot In Command, all aircraft), 60 hours (Last 90 days, all aircraft), 45 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

According to the company chief pilot and director of operations, the copilot was qualified to operate as the pilot in command (PIC) on all Part 135 flights in the B58. The pilot had not obtained the required experience to operate as a PIC on Part 135 flights and was a PIC on Part 91 flights to gain the required experience.

According to the operator's documentation, both pilots were instrument current at the time of the accident.

Federal Aviation Administration (FAA) personnel assigned to the accident conducted an interview with the boyfriend of the pilot on January 11, 2022. The boyfriend stated that the pilot had contacted him via text message on the night of the accident just before departure from SUS. She had reported to him that she "had concerns about this flight in particular due to the weather and her and the other pilot's skill set." Additionally, her concern was that the other pilot had not done a lot of IFR flight, and she was "not very confident in his IFR abilities."

Before employment with AirNet II, the flying experience of both pilots predominantly involved visual flight rules operations.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Beech	<b>Registration:</b>	N585CK
<b>Model/Series:</b>	58	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1981	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	TH-1299
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	6
<b>Date/Type of Last Inspection:</b>	December 9, 2021 100 hour	<b>Certified Max Gross Wt.:</b>	5424 lbs
<b>Time Since Last Inspection:</b>	15 Hrs	<b>Engines:</b>	2 Reciprocating
<b>Airframe Total Time:</b>	24040 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Continental Motors
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	IO-520-CB41B
<b>Registered Owner:</b>	KALITTA CHARTERS LLC	<b>Rated Power:</b>	285 Horsepower
<b>Operator:</b>	Airnet II LLC	<b>Operating Certificate(s) Held:</b>	Commuter air carrier (135)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	2NEA

The airplane was equipped with a “throw-over” type control column, which controlled the elevator and ailerons. To change the yoke from one side of the cockpit to the other, the pilots could pull a T-handle latch on the back of the control arm, then the yoke could be positioned as desired. An optional dual control column that was required for flight instruction existed but was not installed on the accident airplane.

The flight instruments were located on the left side of the panel directly in front of the pilot's seat (see figure 2). Flight instrumentation included attitude and directional gyros, airspeed, altimeter, vertical speed, and turn coordinator. A magnetic compass was mounted above center of the instrument panel.



Figure 2. Instrument panel similar to accident airplane (Note: dual yoke was not installed on the accident airplane)

Vacuum pressure for the attitude gyro was supplied by two, engine-driven, dry pressure pumps interconnected to form a single system. The directional gyro was powered electrically. The airplane was equipped with a Bendix King KFC-200 flight control system (autopilot). The docket for this investigation contains information on the autopilot and its operation.

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Night
<b>Observation Facility, Elevation:</b>	KSUS,462 ft msl	<b>Distance from Accident Site:</b>	11 Nautical Miles
<b>Observation Time:</b>	19:07 Local	<b>Direction from Accident Site:</b>	97°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	2 miles
<b>Lowest Ceiling:</b>	Overcast / 1000 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots / None	<b>Turbulence Type Forecast/Actual:</b>	None / Clear air
<b>Wind Direction:</b>	190°	<b>Turbulence Severity Forecast/Actual:</b>	N/A / Moderate
<b>Altimeter Setting:</b>	29.96 inches Hg	<b>Temperature/Dew Point:</b>	7°C / 6°C
<b>Precipitation and Obscuration:</b>	Moderate - None - Mist		
<b>Departure Point:</b>	St Louis, MO (SUS)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Denver, CO (APA)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	19:10 Local	<b>Type of Airspace:</b>	Class E

A warm frontal boundary existed at the accident site, with IFR conditions at SUS. Clouds likely extended from 1,000 ft above ground level through 10,500 ft msl over the accident site, based on satellite data and an upper air sounding.

There were no non-convective or convective Significant Meteorological Information (SIGMET) advisories valid for the accident site at the accident time. Icing conditions were not present below 11,000 ft msl.

An Airmen's Meteorological Information (AIRMET) for IFR conditions was valid for the accident site at the accident time, as well as an AIRMET for low level wind shear. Strong low- and mid-level wind conditions existed in the area, with moderate turbulence likely at 8,000 ft msl.

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>		<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	38.679489,-90.882436(est)



The airplane impacted into forested terrain (see figure 3). The debris path was on a westerly heading and highly fragmentary. Broken tree limbs indicated the airplane was in a steep descent with a left-wing-low attitude at impact.

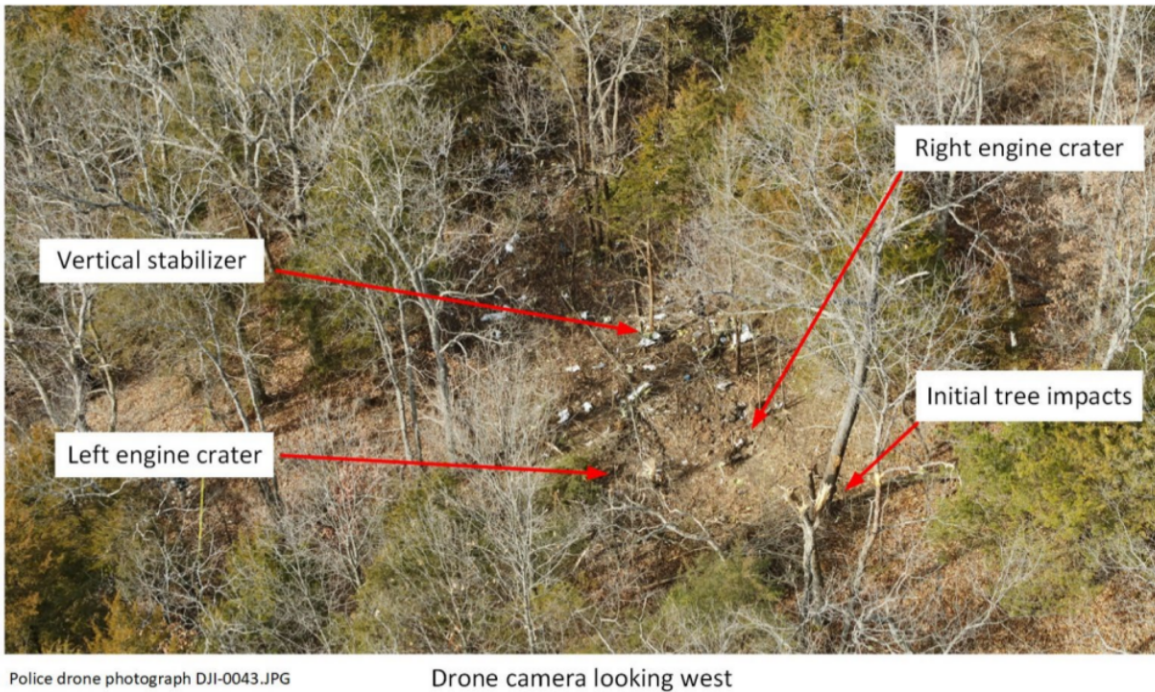


Figure 3. Overhead view of accident site

All of the observed flight control cable separations exhibited signatures of tension overload. One flap actuator was recovered and appeared to be in the flaps retracted position. No signs of heat distress were observed on the cabin heater.

Both three-blade propeller assemblies were highly fragmented. The propeller blades that were recovered at the accident site exhibited varying degrees of chordwise/rotational scoring, leading edge gouging, bending, and twisting.

The cockpit was fractured with no intact flight instruments and no switch positions were identifiable. The vacuum powered attitude gyro rotor and housing, which were found outside of the instrument case, showed indications of rotation at impact. The electrically powered heading gyro rotor was found outside of the remote case and had indications of rotation at impact.

No preaccident mechanical failures or malfunctions with the airplane were observed that would have precluded normal operation.

## **Additional Information**

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### Spatial Disorientation

FAA Publication "Spatial Disorientation Visual Illusions" (OK-11-1550) , states in part "false visual reference illusions may cause you to orient your aircraft in relation to a false horizon; these illusions are caused by flying over a banked cloud, night flying over featureless terrain with ground lights that are indistinguishable from a dark sky with stars, or night flying over a featureless terrain with a clearly defined pattern of ground lights and a dark starless sky." The publication further provides guidance on the prevention of spatial disorientation.

One of the preventive measures was "when flying at night or in reduced visibility, use and rely on your flight instruments." It further states "if you experience a visual illusion during flight (most pilots do at one time or another), have confidence in your instruments and ignore all conflicting signals your body gives you. Accidents usually happen as a result of a pilot's indecision to rely on the instruments."

### AirNet II Spatial Disorientation Training

The AirNet II training curriculum for the B58 included ground training, a minimum of six sessions in a Frasca fixed training device (FTD), and a minimum of five sessions in a B58. Of the six FTD sessions, five included "unusual attitude" maneuvers. Of the five sessions to be conducted in the B58, three included "unusual attitude" maneuvers. The maneuvers included a completion standard that a "pilot should be demonstrating proficiency to commercial PTS (practical test standards) during maneuvers." The director of operations stated that in addition to the practical in the Frasca and the airplane, there was also a briefing session before the lesson and a debriefing session following the lesson for the instructor and student to discuss spatial disorientation and unusual attitudes.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Folkerts, Michael
<b>Additional Participating Persons:</b>	Joel Rich; Flight Standard District Office; St Louis, MO Henry Soderlund ; Textron Aviation; Wichita, KS Thomas Harmon; Airnet II; Columbus, OH
<b>Original Publish Date:</b>	June 14, 2023
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=104504">https://data.nts.gov/Docket?ProjectID=104504</a>

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