# Aviation Investigation Final Report

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| **Location:** | SHAWSVILLE, Virginia | **Accident Number:** | IAD99FA038 |
| **Date & Time:** | April 12, 1999, 14:12 Local | **Registration:** | N3113K |
| **Aircraft:** | Beech BE-95A | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | | **Injuries:** | 4 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The pilot was briefed on two occasions by a flight service briefer and was advised of a SIGMET for moderate to severe turbulence for the departure airport area and along the airplane's proposed route of flight. The pilot acknowledged receipt of a Hazardous In-flight Alert System (HIWAS) alert for moderate to occasional severe turbulence just prior to takeoff. After departure, the tower controller stopped the airplane's climb at 6,000 feet for traffic, then told the pilot to continue the climb to 8,000 feet. The controller had received Pilot Reports (PIREPs) about turbulence and asked the pilot what he was experiencing. The controller did not receive a response, and the airplane disappeared from the radarscope after reaching an altitude of 6,700 feet. Post accident interviews with other pilots revealed they experienced severe turbulence during the same time frame in the vicinity of the accident. Computer analysis of weather data indicated a 100% probability of severe turbulence at 6,000 feet, and at 7,000 feet, vertical motions of 3,153 feet per minute indicated a severe mountain wave. A PIREP placed the base of the cloud layer at 5,400 feet and the tops at 9,500 feet. The airplane's published maximum gross weight was 4,200 pounds, with a center-of-gravity (CG) range of 80.5 inches to 86 inches aft of datum. The airplane's calculated weight at the time of the accident was 4,566 pounds, with the center of gravity calculated at 90.68 inches aft of datum.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's inadequate preflight planning which resulted in intentional flight into known severe turbulence and the subsequent loss of control. Factors in the accident were the turbulence in instrument meteorological conditions and an airplane loaded over the maximum allowable gross weight and outside the allowable center-of-gravity range.

## Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CLIMB - TO CRUISE

Findings
1. (F) WEATHER CONDITION - TURBULENCE IN CLOUDS
2. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
3. (C) PREFLIGHT PLANNING/PREPARATION - INADEQUATE - PILOT IN COMMAND
4. (C) FLIGHT INTO KNOWN ADVERSE WEATHER - INTENTIONAL - PILOT IN COMMAND
5. (F) AIRCRAFT WEIGHT AND BALANCE - EXCEEDED - PILOT IN COMMAND
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Occurrence #2: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. OBJECT - TREE(S)

## Factual Information

HISTORY OF FLIGHT

On April 12, 1999, at 1412 eastern daylight time, a Beech BE-95A, N3113K, was destroyed during a collision with terrain in Shawsville, Virginia. The certificated private pilot and three passengers sustained fatal injuries. Visual meteorological conditions prevailed for the personal flight that originated from Roanoke Regional/Woodrum Field (ROA), Roanoke, Virginia, at 1357. An instrument flight rules flight (IFR) plan was filed for the flight destined for Claxton, Georgia (CWV), and conducted under 14 CFR Part 91.

Air Traffic Control transcripts from the Federal Aviation Administration (FAA) revealed that the pilot was given an IFR clearance and instructed to climb to 8,000 feet after departure. Prior to receiving the clearance, the pilot advised the tower that he had "Information Romeo" from the Automated Terminal Information Service (ATIS). Information Romeo contained a Hazardous In-flight Weather Alert System (HIWAS) alert for, "...moderate to occasional severe turbulence below 12,000 feet due to northwesterly winds over rough terrain..." for the Roanoke area and along the airplane's proposed route of flight.

According to the tower supervisor, the tower controller stopped the airplane's climb at 6,000 feet for traffic. After a brief period, the pilot was told to continue the climb to 8,000 feet. The controller then radioed N3113K and requested a Pilot Report (PIREP). The controller had received other PIREPs about turbulence and was curious what the pilot was experiencing. The controller did not receive a response, and the airplane disappeared from the controller's radarscope. The controller said the airplane had reached an altitude of 6,700 feet before he lost track of the target.

According to the tower supervisor, a review of the voice and radar tapes revealed no distress calls or any emergency transponder codes from N3113K. He said, "We had only routine communications with the airplane."

One witness said, "When I looked up, it was going '...blup, blup, blup, blup...' and the wings were rocking side to side. Then the wing dropped off to the right and it went all the way around. It did a complete donut and then it went straight down." When asked about the weather at the time of the accident, she responded, "It was cloudy and windy. Real windy. Real, real, windy. And chippy...it was cold."

A second witness stated, "It's not uncommon for planes to travel this way. I heard this steady drone and then it just quit...just positively stopped. When I looked up, the airplane just spun." With a model of an airplane in his hand, the witness demonstrated a nose-down, spinning motion.

According to a Warden of the Virginia Game Department, "The winds were really strong up in here yesterday. There were trees blown down all over the county."

A Sergeant with the Virginia State Police stated that he was in the vicinity of ROA at 9,000 feet in a Cessna 182 at the time of the accident. He said he was unable to control his altitude or airspeed. The Sergeant said that in an effort to maintain his assigned altitude, he slowed the airplane to 52 knots with full power applied. He said the airplane continued to descend approximately 700 feet per minute. Almost immediately thereafter, the airplane began a climb and an acceleration that he could not control. He said, "With the power all the way out and the nose pushed over, I couldn't stop the climb. Next thing I know, the airspeed indicator is in the yellow arc and my GPS is showing 190 knots over the ground. In my 25 years of flying, I never experienced anything like it."

The Sergeant further stated that he heard other pilots describe "severe" turbulence over the Roanoke radio frequency, and that throughout his encounter, the outside air temperature dropped from approximately 40 degrees to below freezing.

The pilot of a Beech King Air 200 stated he flew in and out of the Virginia Tech Airport (BCB), 7 miles northwest of the accident site, at the time of the accident. He said he landed at BCB at 1330, and departed at 1405. He stated:

"We experienced moderate turbulence in the clouds all the way to the surface. We did not use any [anti-ice/de-ice] equipment. We did not use the boots. There was a Cherokee pilot on 126.9. He wanted to come back to ROA for severe turbulence. He said, 'This was definitely extreme turbulence.' He was pretty shook up, you could tell by his voice. The tension level was really high.

"It was a terrible day. That was a day that I would rather not have flown in. I strap in really tight and we were coming up out of our seats on arrival and departure. We had 'Pitch Hold' engaged on our autopilot and we experienced plus or minus 15 knots on the airspeed."

The King Air pilot said the base of the cloud layer was at 5,400 feet and the tops were at 9,500 feet.

The accident occurred during the hours of daylight approximately 42 degrees, 28 minutes north latitude, and 76 degrees, 8 minutes west longitude.

PERSONNEL INFORMATION

The pilot held a private pilot certificate with ratings for airplane single engine land, multi-engine land and instrument airplane. His most recent FAA third class medical certificate was issued November 24,1997.

A review of the pilot's logbook revealed the pilot recorded 879.2 hours of flight experience, 190 hours of which were in the BE-95A. Between September 1989, and August 1991, the pilot logged 153 hours of multi-engine time, all in the BE-95A. From August 1991 to November 1998, the pilot logged one flight in a multi-engine airplane; a familiarization ride in a Cessna 401, on February 18, 1996.

An examination of the pilot's logbook revealed numerous discrepancies and bookkeeping errors. A detailed review of the pilot's logs failed to rectify the discrepancies and addition errors. As a result, the following times were approximated. The review revealed the pilot had accumulated approximately 811 hours of total flight experience, 130 hours of which was in multi engine airplanes. Further review revealed the pilot had approximately 122 hours of experience in the BE-95A.

The pilot recorded 36.5 hours of multi-engine experience since November 6, 1998, all of which was in the BE-95A. During that period, the pilot received 3.5 hours of dual instruction in preparation for a multi-engine instrument examination flight.

The pilot's certified "Blue Ribbon" airman file was forwarded from the FAA to the Safety Board. A review of the file revealed the pilot had been a certificated pilot since 1983. He failed his instrument rating flight test on the first attempt (flight portion) and his multi-engine test on the first attempt (oral portion). When he passed his multi-engine flight test, the pilot was not tested to obtain instrument privileges and waited 10 years before he got the 'multiengine limited to VFR only' limitation removed.

The pilot obtained a multi-engine instrument rating on February 19, 1999.

## AIRCRAFT INFORMATION

The airplane was a 1963 Beech BE-95 that had accrued 3,595 hours of total time. The airplane was on an annual inspection program, and the most recent annual inspection was completed on October 5, 1998. From that date, the airplane accrued 36.5 hours of flight time prior to the accident.

## METEOROLOGICAL INFORMATION

A Safety Board meteorologist completed a weather study and a Meteorological Factual Report. According to the weather briefing section of the report:

"...the pilot of N3113K called the Leesburg, Virginia Automated Flight Service Station (AFSS) for weather information. After being advised by the AFSS Briefer of 'windy conditions', the pilot was provided the Roanoke terminal forecast...after reading the forecasts the briefer questioned the pilot if he had copied the information. The pilot never responded, the line was disconnected.

"The pilot of N3113K called the Leesburg, Virginia AFSS a second time... and requested the current conditions for Roanoke, Virginia, and the winds aloft at 3,000 and 6,000 feet. The AFSS briefer responded first with the warning that the Roanoke area was under a SIGMET for moderate to severe turbulence below 12,000 feet, and then provided the Roanoke observation. The winds at 6,000 feet were forecasted at 310 degrees at 48 knots. When advised of the winds aloft at 3,000 feet and 6,000 feet, the pilot made a comment on crosswind concerns and [asked] if there were any lower forecasts. The pilot of N3113K acknowledged the SIGMET, and then requested any en route NOTAMs (Notice to Airmen)."

Prior to departure from Roanoke, the pilot acknowledged receipt of Information Romeo. Information Romeo contained a Hazardous In-flight Weather Alert System (HIWAS) alert for, "...moderate to occasional severe turbulence below 12,000 feet due to northwesterly winds over rough terrain..." for the Roanoke area and along the airplane's proposed route of flight.

Analysis of upper air and radiosonde information from Blacksburg, Virginia, approximately 8 miles northwest of the accident site, was done through a program developed by Environmental Research Services. According to the Upper Air Data section of the report:

"The program indicated at 6,000 feet a 100% probability of severe turbulence, with scattered cumulus clouds, and a 51% probability of light clear ice. At 7,000 feet, mountain wave activity was determined with vertical motions of 3,153 feet per minute indicative of a severe mountain wave. At that level the probability of icing was 87% of moderate clear ice."

WRECKAGE AND IMPACT INFORMATION

The airplane was examined at the site on April 13 and 14, 1999. There was a strong odor of fuel and all major components of the airplane were accounted for at the scene. The airplane came to rest in wooded, mountainous terrain, on a slope of approximately 40 degrees. Tree scars were limited to the area directly above the wreckage and several angular cut branches were noted at the scene.

The nose section was completely destroyed. The instrument panel, control quadrants, and rudder pedals were destroyed and crushed aft into the cabin area. The bottom of the fuselage and both wings were crushed upwards in compression. The fuselage was oriented on a magnetic heading of 045 degrees.

The wing box was separated from the fuselage. The left wing was oriented 252 degrees and the right wing was oriented 040 degrees. Flight control continuity was established from the cockpit area to the right wing and tail. Flight control continuity was established to the left wing outward of the engine nacelle. Control cable breaks were noted in the left wing due to overstress at the aileron bellcrank. Continuity was established from the breaks to the flight control surfaces.

Both windshield posts and all front cabin roof posts were separated from the fuselage. One

cockpit seat and two cabin seats were separated from the airplane and came to rest downslope of the main wreckage. One cabin seat came to rest 30 feet beyond the main wreckage. One cabin seat and one cockpit seat came to rest 54 feet beyond the main wreckage.

The left engine was attached to its mounts. The right engine was separated from its mounts and came to rest underneath the cockpit area.

Strewn across the wreckage path between the airplane and the cockpit seats were several bags of personal articles, camera equipment, and camping gear.

Examination of the Emergency Locator Transmitter (ELT) revealed the battery expiration date was September, 1996.

MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the Chief Medical Examiner, Roanoke, Virginia, performed an autopsy on April 14, 1999.

The FAA Toxicology Accident Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing for the pilot on May 27, 1999.

TESTS AND RESEARCH

A preliminary examination of the engines and propellers was performed on April 15, 1999. All four propeller blades displayed similar twisting, bending, leading edge gouging, and chordwise scratching. The oil sumps of both engines were completely destroyed and the engine cases were cracked; however, both engines could be rotated by hand. Continuity was established through the powertrain, valvetrain, and accessory sections of both engines. Compression was confirmed using the thumb method.

A detailed examination of the airplane's engines was conducted at the Textron Lycoming engine factory in Williamsport, Pennsylvania under the supervision of an FAA Aviation Safety Inspector.

Examination of the left engine confirmed the continuity and compression established at the scene. The internal timing of the engine was verified. A borescope examination revealed no anomalies in the pistons, valves, or cylinders.

The left magneto was timed at 19.5 degrees before top dead center (BTDC) and the right magneto was timed at 25 degrees BTDC. Both magnetos were bench tested and sparked from all terminal leads.

The bottom spark plugs were damaged by impact and would not spark when tested. The top

spark plugs all sparked when tested.  Spark from the #2 spark plug was "weak" when tested.

Complete disassembly of the engine revealed no abnormal wear or pre-impact anomalies.

The most recent overhaul for the left engine was performed at T.W. Smith Aircraft Incorporated on November 19, 1973.  The engine accrued 1,604 hours since that date.

Examination of the right engine confirmed the continuity and compression established at the scene.  The internal timing of the engine was verified.  A borescope examination revealed no anomalies in the pistons, valves, or cylinders.

Both magnetos were timed at 25 degrees (BTDC).  Both magnetos were bench tested and sparked from all terminal leads.  It was noted that the top spark plugs were part number REM38E and the bottom plugs were part number REM40E.  The part number on the #4 top spark plug could not be determined.  The #2 bottom spark plug was damaged by impact and was not tested.  The remaining plugs sparked when tested.

Complete disassembly of the engine revealed no abnormal wear or pre-impact anomalies.

The most recent overhaul for the right engine was performed at T.W. Smith Aircraft Incorporated on October 11, 1972.  The engine was installed in the airplane on November 19, 1973.  The engine accrued 1,604 hours since that date.

According to Textron Lycoming, left and right magneto timing specifications for both engines was 25 degrees BTDC.

Both the left and right propellers were disassembled and a detailed examination was performed under the supervision of an FAA Aviation Safety Inspector at Hartzell Propeller, Inc., Piqua, Ohio, on August 16, 1999.

According to the inspector, all damage noted was impact damage and the examination revealed no pre-impact anomalies.

ADDITIONAL INFORMATION

According to Textron Lycoming Service Instruction Number 1009AM:

"...all engines that do not accumulate the hourly period of time between overhauls specified in this publication are recommended to be overhauled in the twelfth year."

WEIGHT AND BALANCE

Examination of fuel records revealed N3113K was fueled with 26.1 gallons of aviation fuel and departed ROA with full tanks.

The published maximum gross weight of the airplane was 4,200 pounds. At the maximum gross weight, the center-of-gravity (CG) range was listed to be from 80.5 inches, to 86 inches aft of datum.

The contents of the airplane were weighed at the scene using a scale provided by the Virginia Department of Game. The Virginia State Police provided the weights of the occupants. Fuel weight was based on full tanks minus 10 gallons for start-up, taxi, take-off, and initial climb.

A review of weight and balance data revealed the airplane's calculated weight was approximately 4,566 pounds. The airplane's center of gravity was calculated at 90.68 inches aft of datum.

The airplane wreckage was released on May 15, 2000, to a representative of the owner's insurance company.

## Pilot Information

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| **Certificate:** | Private | **Age:** | 42,Male |
| **Airplane Rating(s):** | Single-engine land; Multi-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 3 Valid Medical--no waivers/lim. | **Last FAA Medical Exam:** | November 24, 1997 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 811 hours (Total, all aircraft), 122 hours (Total, this make and model), 590 hours (Pilot In Command, all aircraft), 28 hours (Last 90 days, all aircraft), 13 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Beech | **Registration:** | N3113K |
| **Model/Series:** | BE-95A BE-95A | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | TD-530 |
| **Landing Gear Type:** | Retractable - Tricycle | **Seats:** | 4 |
| **Date/Type of Last Inspection:** | October 5, 1998 Annual | **Certified Max Gross Wt.:** | 4200 lbs |
| **Time Since Last Inspection:** | 36 Hrs | **Engines:** | 2 Reciprocating |
| **Airframe Total Time:** | 3595 Hrs | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Installed, not activated | **Engine Model/Series:** | IO-360 |
| **Registered Owner:** | DAVID M. SMITH | **Rated Power:** | 180 Horsepower |
| **Operator:** | | **Operating Certificate(s) Held:** | None |
| **Operator Does Business As:** | | **Operator Designator Code:** | |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Instrument (IMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | ROA ,1176 ft msl | **Distance from Accident Site:** | 20 Nautical Miles |
| **Observation Time:** | 14:28 Local | **Direction from Accident Site:** | 60° |
| **Lowest Cloud Condition:** | Unknown | **Visibility** | 10 miles |
| **Lowest Ceiling:** | Overcast / 3800 ft AGL | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 15 knots / 21 knots | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 310° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30 inches Hg | **Temperature/Dew Point:** | 9°C / 1°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | ROANOKE , VA (ROA ) | **Type of Flight Plan Filed:** | IFR |
| **Destination:** | CLAXTON , GA (CWV ) | **Type of Clearance:** | IFR |
| **Departure Time:** | 13:57 Local | **Type of Airspace:** | Class E |

## Airport Information

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| **Airport:** | | **Runway Surface Type:** | |
| **Airport Elevation:** | | **Runway Surface Condition:** | |
| **Runway Used:** | 0 | **IFR Approach:** | None |
| **Runway Length/Width:** | | **VFR Approach/Landing:** | |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | 3 Fatal | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 4 Fatal | **Latitude, Longitude:** | 37.129524,-80.249275(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Rayner, Brian |
| **Additional Participating Persons:** | JOHN A WAGER; RICHMOND , VA<br>STUART BOTHWELL; WICHITA , KS<br>ED ROGALSKI; BELLEVIEW , FL |
| **Original Publish Date:** | May 8, 2001 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=46131 |