Aviation Investigation Final Report

Location:	ROANOKE, Virginia	**Accident Number:**	NYC96FA163
Date & Time:	August 13, 1996, 00:20 Local	**Registration:**	N1795W
Aircraft:	Beech A36	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The flight was cleared for the ILS runway 33 approach and was approved a frequency change, which the pilot acknowledged. Radar data revealed that the flight was left of the localizer course and above the glide slope throughout the entire approach. The flight then over flew the airport at 4,100 feet to the northwest with a continuous descent. The pilot's last recorded transmission, which ended abruptly, was his intentions to execute the missed approach, at which time the radar data showed the flight about 5 miles northwest of the airport at 2,700 feet. The wreckage was located about 5 miles northwest of the airport at an approximate elevation of 2,600 feet. Examination of the wreckage did not disclose evidence of a mechanical malfunction with the airframe or engine. According to the instrument approach plate, for the ILS runway 33 approach, the missed approach point was located prior to the runway threshold at a decision height of 1,660 feet.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's failure to follow the published instrument approach procedures, and his delayed missed approach, which resulted in an inflight collision with mountainous terrain.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: APPROACH

Findings
1. LIGHT CONDITION - DARK NIGHT
2. TERRAIN CONDITION - MOUNTAINOUS/HILLY
3. TERRAIN CONDITION - RISING
4. (C) IFR PROCEDURE - NOT FOLLOWED - PILOT IN COMMAND
5. (C) MISSED APPROACH - DELAYED - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On August 13, 1996, about 0020 eastern daylight time, N1795W, a Beech A36, a cargo flight operated by Ramp 66 as Pelican 405, was destroyed when it impacted mountainous terrain during an instrument approach at Roanoke Regional Airport (ROA), Roanoke, Virginia. The certificated commercial pilot, the sole occupant, was fatally injured. Instrument meteorological conditions prevailed, and an instrument flight rules flight plan was filed. The departure point was Charlotte, North Carolina for the flight conducted under 14 CFR Part 135.

A review of the Washington Air Route Traffic Control Center communication transcript and tapes revealed that the pilot was communicating with radar controllers when the flight was vectored and cleared for the ILS runway 33 approach to ROA. The air traffic control facility at ROA closed about 0000, and the pilot was communicating over the ROA common traffic advisory frequency (CTAF), with a commuter flight crew that was being vectored for the ILS 33 approach behind N1795W.

During the approach, the Washington controller issued N1795W a 360 degree heading to intercept the localizer for the ILS 33 approach, at 0010:31. At 0011:27, the controller radioed, "Pelican four oh five, about five south of Vinton, maintain six thousand until established on the localizer, cleared ILS runway three three approach at Roanoke." The pilot replied, at 0011:35, "Okay, cleared ILS three three at Roanoke, Pelican four oh five." The radar data indicated, at 0011:34, the flight was about 6 to 7 miles south southeast of Vinton NDB, at 6,200 feet. The Washington controller terminated radar services with N1795W and approved a frequency change to the CTAF, at 0012:49, which the pilot acknowledged. N1795W was observed on radar to parallel the localizer course to the west and crossed the Vinton NDB, at about 5,800 feet, at 0013:58. The flight crossed the outer marker about 4,900 feet at 0015:34, the middle marker about 4,700 feet, at 0016:34, the airport about 4,100 feet, at 0017:34, and then observed to track on a northwest course from the airport while descending. The last radar target, about 0020:09, was on a 5 mile 330 degree bearing from ROA, at an altitude of 2,700 feet. During the approach, about 0019:20, the commuter crew asked the accident pilot over the ROA CTAF what altitude he broke out of the clouds, which the pilot responded, ". . .were still about twenty nine hundred, we're starting to see some ground now." About 25 seconds later, the accident pilot radioed, "I'll tell you what I'm gonna do is I'm gonna do a missed approach, my uh needles are (?) working (?)." This was the last recorded transmission, which ended abruptly.

A witness working at the airport reported that he heard a steady engine noise overhead the airport, to the right of, and 1,000 feet down runway 33, heading northwest, about 0015. He stated that the engine sounded like it was at a low power, "descent power" setting, and that the

runway lights were on. Another witness in the vicinity of the accident site reported hearing engine sounds just prior to hearing an impact, and stated that "it was very foggy and raining."

The accident occurred during the hours of darkness about 37 degrees, 6 minutes north latitude, and 79 degrees, 49 minutes west longitude.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with ratings for airplane single and multi engine land, and instrument airplane. He also held a flight instructor certificate with ratings for airplane single and multi engine land, and instrument airplane.

The pilot's most recent Federal Aviation Administration (FAA) Second Class Medical certificate was issued on September 22, 1995, with no limitations.

A review of the operator's training records revealed that the pilot completed his initial captain training on June 22, 1996. The operator provided the pilot training, which consisted of 20 flight hours, of which 15 hours were instrument time. The pilot had a total flight experience of approximately 2,000 hours, including 284 hours of night time, and 190 hours of total instrument time.

WRECKAGE AND IMPACT INFORMATION

The wreckage was examined on August 13, 1996. The examination revealed that the airplane came to rest approximately 5 miles northwest of ROA, at an elevation of 2,600 feet. Wreckage was strewn, on upsloping mountainous terrain, for approximately 250 feet, oriented on a 320 degree heading. Both wings and tail were separated from the fuselage precluding examination of flight control continuity. The landing gear lever was in the retracted position. The right and left main landing gear assembles were separated from their respective wings. The right main landing gear strut, outboard gear door, and main landing gear were about 170, 170, and 110 feet respectively, prior to the main wreckage. Examination of the radios revealed that both navigational radios were tuned to a frequency of 109.7, and the Automatic Direction Finder was tuned to a frequency of 278. Tree limbs were observed on the ground along the wreckage path. Two of the tree limbs were approximately 1 1/2 feet long, 1 1/2 inch diameter, and were cut cleanly on both ends at 45 and 90 degree angles.

The engine was removed and examined in a hangar at ROA on August 14, 1997. Examination of the engine revealed no evidence of mechanical malfunctions.

METEOROLOGICAL INFORMATION

The weather reported at ROA, at 0018 was: winds from 010 degrees at 7 knots; visibility 7 miles with light rain; 900 feet scattered, 1,300 feet broken and 1,600 feet overcast; temperature 63 degrees F; dewpoint 61 degrees F; altimeter 29.98 inches Hg.

AIRCRAFT INFORMATION

A review of maintenance records revealed that the marker beacon assembly was tested April 2, 1996, and found inoperative. The marker beacon assembly was removed and placarded inoperative.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot, on August 13, 1996, by William Massello, III, M.D., Assistant Chief Medical Examiner, for the Office of The Chief Medical Examiner, Roanoke County, Roanoke, Virginia.

A toxicological test was performed by the Western Laboratory, Roanoke, Virginia with negative results for drugs and ethanol.

TESTS AND RESEARCH

The flight instruments were tested under the supervision of the NTSB IIC at Piedmont Aviation Services, Inc., Roanoke, Virginia, August 14, 1996. The attitude indicator and heading indicator were operational. The altimeter was functionally tested, and was within 16 feet of accuracy. The airspeed indicator was disassembled and observed to have a paint transfer mark, similar to that of the airspeed indicator needle color and shape, at 160 MPH on the outer scale and 140 knots on the inner scale. The remaining flight instrument tests were inconclusive due to impact damage.

The navigational radios were tested under the supervision of the NTSB IIC at Allied Signal Inc., General Aviation Avionics, Olathe Kansas, September 12, 1996. During the testing, all radios were operational except the vor/localizer glide slope, which was inconclusive due to impact damage. Initial examination of the container revealed that it was not broken open and all parts were contained within. Internal examination revealed that the cover for the glide slope receiver RF section was missing.

AERODROME INFROMATION

The published instrument approach procedure for the ILS runway 33 approach to ROA, depicted the airport elevation to be 1,176 feet, with "mountainous terrain higher than airport in all quadrants." Runway 33 was 5,800 feet long and 150 feet wide. The profile view depicted a glide slope intercept and minimum altitude of 3,800 feet prior to the Vinton NDB, followed by a descent to the decision height of 1,660 feet. The Localizer runway 33 approach profile view depicted a descent from 3,800 feet after crossing the Vinton NDB, with a minimum altitude of 2,600 feet until crossing the Outer Marker Beacon, followed by a final descent to the minimum descent altitude of 1,940 feet. The missed approach point was based on a groundspeed and elapsed time from the Vinton NDB. The localizer frequency was 109.7, and the Vinton NDB

frequency was 277.

The missed approach point (MAP) for the ILS runway 33 approach, was located prior to reaching the approach end of runway 33. The MAP procedure required a climbing left turn to 4,000 feet, and depicted a holding pattern at an intersection, southeast of ROA.

ADDITIONAL INFORMATION

On November 11, 1996, the NTSB IIC conducted practice ILS runway 33 approaches to ROA, in a Beech A36. The approaches were conducted similar to that observed on the radar track of the accident flight. The glide slope was intercepted at 6,000 feet when the flight was about 5 miles south of Vinton NDB. As the flight proceeded to Vinton, the glide slope was not tracked, and an altitude of 6,000 feet was maintained. The glide slope needle was observed to gradually deflect full scale down. Upon crossing Vinton, the approach continued at a indicated airspeed of 160 knots with a 500 foot per minute descent rate. On an approximate 5 mile final, the glide slope needle was observed to fluctuate between the full scale up and down deflections until crossing the runways at about 4,000 feet, and continued to fluctuate beyond the runways. Also, the Automatic Direction Finder (ADF) was tuned to the Vinton frequency of 277 with an audible Morse code and needle indication. The ADF was then tuned to 278 with the same results.

AIDS TO NAVIGATION

In the FAA Advisory Circular 61-27C, Instrument Flying Handbook, under electronic aids to instrument flying, instrument landing system, glide slope, it stated:

"The term "glide slope" means the complete radiation pattern generated by the glide slope facility. The term "glide path" means that portion of the glide slope that intersects the localizer. . . .The course projected by the glide slope equipment is essentially the same as would be generated by a localizer operating on its side. . . .The glide slope projection angle is normally adjusted to 2.5 to 3 degrees above horizontal so that it intersects the middle marker at about 200 feet and the outer marker at about 1,400 feet above the runway elevation."

"Unlike the localizer, the glide slope transmitter radiates signals only in the direction of the final approach on the "front course". The system provides no vertical guidance for approaches on the "back course." The glide path is normally 1.4 degrees thick. At 10 nautical miles from the point of touchdown, this represents a vertical distance of approximately 1,500 feet, narrowing to a few feet at touchdown."

"False Courses. In addition to the desired course, glide slope facilities inherently produce additional courses at higher vertical angles: the angle of the lowest of these "false courses" will occur at approximately 12.5 degrees. However, if your approach is conducted at the altitudes specified on the appropriate approach chart, these false courses will not be encountered."

"Deflection of the glide slope needle indicates the position of the aircraft with respect to the glide path. When the aircraft is above the glide path, the needle is deflected downward. When the aircraft is below the glide path, the needle is deflected upward. When the aircraft is on the glide path, the needle is horizontal, overlying the reference dots. Since the glide path is much sharper than the localizer course (approximately 1.4 degrees from full "up" to full "down" deflection), the needle is very sensitive to displacement of the aircraft from on-path alignment. With the proper rate of descent established on glide slope interception, very small corrections keep the aircraft aligned."

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	28,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):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	September 22, 1995
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	2013 hours (Total, all aircraft), 82 hours (Total, this make and model), 1832 hours (Pilot In Command, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N1795W
Model/Series:	A36 A36	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	E-381
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	August 2, 1996 100 hour	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:	18 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4263 Hrs	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	IO-520-B
Registered Owner:	GRAND STRAND AVTN (DBA)RAMP 66	**Rated Power:**	285 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	ROA ,1176 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	00:18 Local	**Direction from Accident Site:**	150°
Lowest Cloud Condition:	Scattered / 900 ft AGL	**Visibility**	7 miles
Lowest Ceiling:	Broken / 1300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	10°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	17°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	CHARLOTTE , NC (CLT)	**Type of Flight Plan Filed:**	IFR
Destination:	(ROA)	**Type of Clearance:**	IFR
Departure Time:	23:30 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	ROANOKE REGIONAL ROA	**Runway Surface Type:**	Asphalt
Airport Elevation:	1176 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	33	**IFR Approach:**	ILS
Runway Length/Width:	5800 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Kukla, Randi-jean
Additional Participating Persons:	THOMAS JONES; RICHMOND , VA GEORGE M HOLLINGSWORTH; RESTON , VA PAUL E YOOS; WICHITA , KS
Original Publish Date:	August 29, 1997
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=39095