National Transportation Safety Board
Aviation Accident Final Report

Location:	Pownal, VT	**Accident Number:**	NYC06MA192
Date & Time:	08/04/2006, 0918 EDT	**Registration:**	N59BA
Aircraft:	Embraer 110P1	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

The airport's instrument approach procedures included a very high frequency, omni-directional range (VOR) approach, and a global positioning system (GPS) approach that was not an overlay. The VOR approach procedure included an inbound course to the VOR, and after passage, a descent along the same course to a missed approach point. The missed approach point was defined as 6 nautical miles beyond the VOR, as well as by timing. The pilot twice attempted the VOR approach in instrument meteorological conditions. He flew the first approach to the missed approach point, initiated a missed approach, contacted the controller, and requested a second VOR approach. He then received vectors to rejoin the approach course inbound to the VOR. The airplane subsequently passed over the VOR, on course, about 100 feet above the minimum altitude. However, instead of descending as described in the procedure, the airplane maintained that altitude until reaching the airport, then began a descent. The airplane continued to travel outbound along the same approach course until it impacted rising terrain about 6.5 miles beyond the airport. There was no dedicated distance measuring equipment (DME) onboard the airplane. Instead, distance was determined by the use of an instrument flight rules (IFR)-approved GPS unit. Due to the non-storage capability of the unit, historical waypoint selection could not be determined. The pilot could have selected the airport as a "direct to" waypoint, or, if he had entered flight plan waypoints, the unit would have sequenced from the VOR to the airport during the first approach. In either case, unless the pilot reprogrammed the unit, the last waypoint entered would have remained at the airport, rather than the VOR. The pilot then most likely mistook the airport position for the VOR position, and displaced the beginning of the descent by 6 nautical miles. Also noted, was that once the airplane passed over the VOR en route to the airport, the HSI would have indicated a change of "to" to "from". There were no medical anomalies noted with the pilot and no mechanical anomalies noted with the airplane.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's misinterpretation of the airplane's position relative to the final approach fix, which resulted in the displacement of the descent profile by 6 nautical miles and the subsequent

controlled flight into rising terrain. Contributing to the accident were the low clouds.

Findings

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

Findings
1. (C) NAVAID SIGNAL - MISJUDGED - PILOT IN COMMAND
2. TERRAIN CONDITION - MOUNTAINOUS/HILLY
3. DESCENT - DELAYED - PILOT IN COMMAND
4. (F) WEATHER CONDITION - CLOUDS

Factual Information

HISTORY OF FLIGHT

On August 4, 2006, at 0918 eastern daylight time, an Embraer 110P1, N59BA, operated by Business Air, Inc., doing business as AirNow, was destroyed when it impacted mountainous terrain in Pownal, Vermont. The certificated airline transport pilot was fatally injured. Instrument meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan had been filed for the flight, from Greater Binghamton/Edwin A. Link Field (BGM), Binghamton, New York, to William H. Morse State Airport (DDH), Bennington, Vermont. The positioning flight was being conducted under 14 Code of Federal Regulations Part 91.

According to company personnel, the airplane was en route to the company's headquarters at Morse State Airport to undergo scheduled maintenance. Company flight followers reported that the pilot had attempted one, very high frequency omni-directional range (VOR) runway (RWY) 13 approach to minimums, but had not been able to land and was attempting a second approach when contact was lost.

The VOR RWY 13 approach procedure called for the pilot to maintain a minimum of 3,400 feet above mean sea level (msl) until passing over the Cambridge VOR. It then provided for a descent, along a 160-degree magnetic course, to 1,880 feet msl [1,062 feet above ground level (agl)], to a missed approach point, defined as 6 nautical miles beyond the VOR. The missed approach point was also defined by timing. The missed approach procedure included a climbing left turn to 3,400 feet msl, and back to the VOR.

A review of the Albany Approach Control, East Feeder Sector voice communications recording revealed that the pilot initially received radar vectors to the final approach course for the VOR RWY 13 approach, was cleared for the approach, and subsequently executed a missed approach. He then requested another VOR RWY 13 approach, received vectors to rejoin the final approach course outside the VOR, and was again cleared for the approach. Radar services were terminated, and the pilot was told to "report cancellation of the i-f-r in the air this frequency or on the ground with Burlington Flight Service. In the event of the missed approach, execute the published missed approach, return to this frequency, change to advisory is approved." The pilot acknowledged the call, and there were no further transmissions from the airplane.

The controller then spoke almost continuously to other aircraft for the next 13 minutes. At the end of the 13 minutes, the controller conducted a passdown to an oncoming controller. During the passdown, he stated: "Missed approach at Bennington local times and we're waiting for him. He was observed about two to the south, about two point four [illegible]. He was missin'. Never reported back on. He wanted to go to Albany if he couldn't get in on the second time."

Radar data revealed that during the first approach, the airplane began a descent from 3,500 feet msl at the VOR, and at the missed approach point, executed a missed approach. The airplane then climbed to 5,100 feet and was vectored back to the final approach course. It joined the final approach course, and descended to 3,500 feet inbound to the VOR. It subsequently passed over the VOR, on course, about 3,500 feet msl, but instead of descending, it maintained that altitude until reaching the airport. At the airport, the airplane began a descent. The airplane continued to travel outbound from the airport, along the same course, until the last radar contact, at 0918:35, about 2 nautical miles to the southeast, at 2,600 feet.

AIRPORT INFORMATION

Morse State Airport runway 13 was 3,704 feet long and 75 feet wide, and airport elevation was 827 feet. In addition to the VOR RWY 13 approach, there was a global positioning system (GPS) RWY 13 approach, with an inbound course of 132 degrees magnetic.

AIRPLANE INFORMATION

The airplane was an Embraer (EMB) 110P1 Bandeirante, powered by two Pratt and Whitney PT-6A engines. The airplane had been converted from a passenger configuration to a cargo configuration and was being operated by a single pilot under an approved Supplemental Type Certificate (STC). There was no dedicated distance measuring equipment (DME) onboard; distances to fixes/waypoints were provided by an approved IFR-certified Garmin GPS 155. VOR information was received via a King KN-53 navigation receiver and displayed on a King KI 525 horizontal situation indicator (HSI).

There was no ground proximity warning system (GPWS), autopilot, or cockpit voice recorder or flight data recorder onboard, and the GPS 155 did not have the capability to retain data.

PILOT INFORMATION

The pilot, age 47, held an airline transport pilot certificate, with an airplane multi-engine land rating, and an EMB-110 type rating. He also had commercial privileges for airplane single-engine land and rotorcraft/helicopter. According to the pilot's logbook and company records, he had accumulated 2,877 hours of flight time, with 84 hours in the EMB-110. Of his flight time in the EMB-110, about 72 hours were as pilot-in-command. The pilot's logbook also indicated that he had 86 hours of actual instrument time, 187 hours of simulated instrument time, and 1,000 hours of helicopter time.

The pilot's latest first-class medical certificate was issued on March 21, 2006, and contained a limitation that corrective lenses be worn. The pilot began training with the company on May 17, 2006, completed a Part 135 check ride with a company pilot on June 9, 2006, and an EMB-110 type rating check ride with a Federal Aviation Administration (FAA) inspector on June 15, 2006.

According to his company flight instructor, the accident pilot had "solid instrument skills," and a "good knowledge base." The accident pilot "maintained situational awareness" during their flights together and recognized an error when he made one. When asked about the use of the GPS in reference to the VOR RWY 13 approach, the flight instructor stated that the Cambridge VOR must be set as the "active" waypoint. However, if a flight plan was loaded in the GPS, it would sequence to the next waypoint if the unit was in normal mode (not in hold.)

According to the company duty log, the pilot was on the fifth day of a 5-day duty cycle. On August 2, 2006, the pilot reported for duty at 1700, and after six flight legs, landed in Elmira, New York, at 2345. On August 3, 2007, the pilot departed Elmira at 0518, flew three additional legs, and went off duty after landing in Rochester, New York, at 0915. The pilot went back on duty at 2100, and flew one leg to Buffalo, New York, landing at 2210. On August 4, 2006, the pilot checked in with company flight following at 0543, and flew a Part 135 flight to Binghamton, New York, before departing on the accident flight.

METEOROLOGICAL INFORMATION

Weather, recorded at Morse State Airport at 0913, included calm winds, 10 statute miles

visibility, a scattered cloud layer at 500 feet agl, an overcast cloud layer at 900 feet agl, temperature 70 degrees Fahrenheit (F), dew point 66 degrees F, and an altimeter setting of 29.83 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located on tree-covered, rising terrain, 156 degrees magnetic, 6.5 nautical miles from Morse State Airport, in the vicinity of 42 degrees, 48.3 minutes north latitude, 73 degrees, 09.4 minutes west longitude.

Elevation was approximately 2,100 feet. Tree cuts were consistent with the airplane having been in an approximately nose-level, 5- to 10-degree right-wing-down attitude.

The airplane was highly fractured, and the main wing sections and cabin areas exhibited fire damage. The landing gear was up, and flap drive measurements indicated an approximately 10-degree flap setting.

All flight control surfaces were accounted for at the scene. Flight control continuity could not be confirmed due to multiple control cable breaks consistent with overload.

Both engines were separated from their wing mounts, and both sets of propellers were separated from the engines. Both propellers exhibited damage consistent with power on at impact.

On September 7, 2006, the wreckage was moved to a storage facility in Biddeford, Maine. Two days later, the engines were examined under FAA supervision. There was no evidence of mechanical failure, and both engines exhibited signatures consistent with medium-to-high power settings.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot at the Office of the Chief Medical Examiner, Vermont State Department of Health, Burlington, Vermont. Toxicological testing was subsequently performed by the FAA Forensic Toxicology Research Team, Oklahoma City, Oklahoma. Final reporting indicated no medical anomalies.

ADDITIONAL INFORMATION

Including this accident, AirNow experienced four Embraer 110 accidents between January 2005 and August 2006, two of which were fatal. Two of the previous accidents involved a loss of engine power to one engine and one previous accident involved fuel starvation.

Pilot Information

Certificate:	Airline Transport	**Age:**	47, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1	**Last FAA Medical Exam:**	03/01/2006
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	06/01/2006
Flight Time:	2877 hours (Total, all aircraft), 84 hours (Total, this make and model), 84 hours (Last 90 days, all aircraft), 41 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Embraer	**Registration:**	N59BA
Model/Series:	110P1	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	396
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	AAIP	**Certified Max Gross Wt.:**	13007 lbs
Time Since Last Inspection:	87 Hours	**Engines:**	2 Turbo Prop
Airframe Total Time:	40043 Hours at time of accident	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	Installed, not activated	**Engine Model/Series:**	PT6A-34
Registered Owner:	Wells Fargo Bank NW NA Trustee	**Rated Power:**	750 hp
Operator:	Business Air, Inc.	**Operating Certificate(s) Held:**	On-demand Air Taxi (135)
Operator Does Business As:	AirNow	**Operator Designator Code:**	BQTA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	DDH, 800 ft msl	**Distance from Accident Site:**	7 Nautical Miles
Observation Time:	0913 EDT	**Direction from Accident Site:**	70°
Lowest Cloud Condition:	Scattered / 500 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	Overcast / 900 ft agl	**Visibility (RVR):**	
Wind Speed/Gusts:	Calm /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.83 inches Hg	**Temperature/Dew Point:**	21°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Binghamton, NY (BGM)	**Type of Flight Plan Filed:**	IFR
Destination:	Bennington, VT (DDH)	**Type of Clearance:**	IFR
Departure Time:	0820 EDT	**Type of Airspace:**	

Airport Information

Airport:	William H Morse (DDH)	**Runway Surface Type:**	Asphalt
Airport Elevation:	827 ft	**Runway Surface Condition:**	Dry
Runway Used:	13	**IFR Approach:**	VOR
Runway Length/Width:	3704 ft / 75 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	
Total Injuries:	1 Fatal	**Latitude, Longitude:**	42.805000, -73.157222

Administrative Information

Investigator In Charge (IIC):	Paul R Cox	**Report Date:**	12/28/2008
Additional Participating Persons:	Eric West; FAA/AAI-100; Washington, DC Steve McClure; AirNow; Bennington, VT Elaine Summers; Accredited Representative - Canada; Ottawa, ON Canada, Tom Berthe; Advisor, Pratt and Whitney Canada; Burlington, VT Sidney Da Siva; Accredited Representative - Brazil; Brasilia, Brazil, Mark Lowell; Advisor, Embraer; Fort Lauderdale, FL		
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Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		