



National Transportation Safety Board Aviation Accident Final Report

Location:	Swanzey, NH	Accident Number:	NYC05FA042
Date & Time:	01/13/2005, 2215 EST	Registration:	N49BA
Aircraft:	Embraer EMB-110P1	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

En route to the company's home airport, the twin-engine airplane either experienced a loss of power to the right engine, or the pilot decided to shut the engine down. Although the home airport had night visual meteorological conditions, and there was no evidence of any malfunction with the remaining engine, the pilot opted to fly a night precision instrument approach to an airport 45 nautical miles closer, with a 1-mile visibility and a 100-foot ceiling. Unknown to the pilot, there was also fog at the airport. The pilot did not advise or seek assistance from air traffic control or the company. When the airplane broke out of the clouds, it was not stable. Approaching the runway, at full flaps and exceeding the 25 percent maximum for a go-around, the pilot added full power to the left engine. The high power setting, slow airspeed, and full flaps combination resulted in a minimum control speed (V_{mc}) roll. No determination could be made as to why the right engine was inoperative, and there were no mechanical or fuel-related anomalies found that would have precluded normal operation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper decision to attempt a single-engine missed approach with the airplane in a slow airspeed, full flap configuration, which resulted in a minimum control speed (V_{mc}) roll. Contributing factors included an inoperative engine for undetermined reasons, the pilot's in-flight decision to divert to an airport with low ceilings and visibility while better conditions existed elsewhere, the pilot's failure to advise or seek assistance from air traffic control or his company, and the low cloud ceilings, fog, and night lighting conditions.

Findings

Occurrence #1: LOSS OF ENGINE POWER

Phase of Operation: CRUISE

Findings

1. (F) 1 ENGINE
2. REASON FOR OCCURRENCE UNDETERMINED
3. (F) PROPER ASSISTANCE - NOT OBTAINED - PILOT IN COMMAND

Occurrence #2: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: MISSED APPROACH (IFR)

Findings

4. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
5. AIRSPEED(VMC) - NOT MAINTAINED - PILOT IN COMMAND
6. (F) WEATHER CONDITION - FOG
7. FLAPS - EXCESSIVE - PILOT IN COMMAND
8. (F) WEATHER CONDITION - LOW CEILING
9. MANEUVER - INADVERTENT - PILOT IN COMMAND
10. (F) LIGHT CONDITION - NIGHT
11. (F) WEATHER EVALUATION - INCORRECT - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Findings

12. TERRAIN CONDITION - RUNWAY

Factual Information

HISTORY OF FLIGHT

On January 13, 2005, about 2215 eastern standard time, an Embraer EMB-110P1, N49BA, operated by Business Air, Incorporated as AirNow flight 2352, was destroyed when it impacted the runway at Dillant Hopkins Airport (EEN), Swanzey, New Hampshire. The certificated airline transport pilot was fatally injured. Night instrument meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the flight that departed Bangor International Airport (BGR), Bangor, Maine. The non-scheduled cargo flight was conducted under 14 Code of Federal Regulations Part 135.

According to the operator's dispatch telephone log, at 1831, the pilot contacted the operator from Bangor, and discussed the weather. At 2018, the flight departed and proceeded towards Manchester. The log entry, at 2144, indicated that the pilot was unable to land at Manchester, and was holding. After discussions with company personnel, it was agreed the pilot would proceed to Bennington, Vermont, where the company was based. Bennington visibility at the time was 10 statute miles and the ceiling was 2,900 feet.

According to air traffic control transcript excerpts, at 2148, the pilot contacted Boston Consolidated Terminal Radar Approach Control, and confirmed "when able, direct bennington." Two minutes later, the pilot reported that he was level at 6,000 feet.

At 2155, the pilot began a series of transmissions with the controller, requesting to land at Keene, rather than Bennington, as "it's right on the way i believe to bennington." The controller provided a vector to Keene, and about 3 minutes later, had the pilot switch to another frequency. During the initial contact with the next controller, the pilot advised that he was "looking for the i-l-s." The controller provided a vector for the approach, cleared the pilot to descend to 5,000 feet, provided an altimeter setting of 29.92, and requested that the pilot "advise with the weather at keene." The pilot responded, "twenty three fifty two has the weather at keene."

The controller subsequently provided an adjustment to the vector, and at 2208, advised the pilot that his company wanted to speak to him, which the pilot acknowledged. One minute later, the pilot advised the controller, "we'd like to keep it in tight if we can," and the controller provided the pilot a new vector and cleared him to descend to 3,000 feet, which the pilot acknowledged.

At 2211, the controller provided the pilot a final vector, and advised him to maintain 3,000 feet until established on the approach, "cleared for the i-l-s two keene."

At 2211:59, the pilot reported "established inbound," and the controller advised that radar service was terminated, "cancel with me or flight service, change to advisory good night," which the pilot acknowledged.

No further transmissions were received from the airplane, and according to the transcript and the telephone log, at no time did the pilot report any mechanical malfunctions.

A witness, who had pulled off the road adjacent to approach end of runway 02 to make a cell phone call, stated that she saw the approach lights illuminate. The witness then observed the airplane, with its landing lights illuminated, appear from the clouds. The wings were rocking up and down so far that the witness thought a wing would strike the ground, once the airplane

landed. As the airplane continued towards the airport, it flew in and out of low-lying clouds. The witness's attention became diverted momentarily, until she heard the engine noise from the airplane increase to "very loud." The witness looked back towards the airport, and observed a large fireball. The witness added that the weather at the time of the accident was "foggy".

PILOT INFORMATION

The pilot held an airline transport pilot certificate with a rating for multi-engine land airplanes and a commercial pilot certificate for single-engine land and sea airplanes. His most recent application for a Federal Aviation Administration (FAA) second-class medical certificate was dated January 31, 2004.

According to the pilot's logbook, he had accumulated about 2,292 hours of total flight experience, with about 338 hours in make and model. The pilot had also accumulated about 360 hours of multi-engine flight experience, 520 hours of night flying experience, and 160 hours of actual instrument flight experience.

AIRPLANE INFORMATION

The airplane was a 1980 Embraer (EMB)-110P1 Bandeirante, powered by two Pratt and Whitney Canada PT6A-34 engines. The airplane had been converted from a passenger configuration to a cargo configuration and was being operated by a single pilot, with no autopilot, under an approved Supplemental Type Certificate (STC). The airplane's maintenance was performed according to an FAA Approved Aircraft Inspection Program (AAIP), and it was carrying small packages at the time of the accident.

According to the right engine maintenance logbook, on November 13, 2000, the engine was "continue time inspected I/A/W Pratt and Whitney Canada Overhaul Manual," and converted to a PT6A-36 engine. Time since overhaul on that date was listed as 0.0 hours. On February 6, 2001, at 15.3 hours since overhaul, the engine was converted back to a PT6A-34 engine. The engine was then installed on the left side of another EMB-110P1 on February 21, 2001. On June 29, 2003, the engine was removed, and installed on the right side of the accident airplane at 45 hours since overhaul. Time since overhaul, as of January 13, 2005, was listed as 429.3 hours.

AIRPORT INFORMATION

Runway 02 was 6,201 feet long and 100 feet wide. Touchdown zone elevation was 488 feet.

Keene was about 35 nautical miles from Manchester, approximately en route to Bennington, which was about 80 nautical miles from Manchester.

The instrument landing system runway 02 (ILS RWY 02) approach minimum for the straight in approach was 1 statute mile of visibility, and the decision altitude was 823 feet mean sea level [msl] (335 feet above ground level [agl]). The missed approach procedure was to climb to 1,600 feet, via a heading of 006 degrees, then a climbing left turn to 3,000 feet, direct to the EEN VOR, and hold. The EEN VOR was located about 5.7 miles south of the airport.

According to an FAA inspector, the ILS RWY 02 system was "ground checked" the day after the accident, with no anomalies noted.

WEATHER INFORMATION

The weather, reported at the airport at 2215, included winds from 350 degrees true at 3 knots, 1 statute mile of visibility, an overcast cloud layer at 100 feet agl, temperature 2 degrees Celsius,

dew point 1 degree Celsius, and an altimeter setting of 29.91 inches of mercury.

A law enforcement officer, who responded to the accident within 3 minutes, stated that the weather at the airport was "so foggy that I could not see the flashing blue lights from my patrol car which was parked 15 feet from the accident site."

WRECKAGE INFORMATION

The airplane came to rest inverted on runway 02, about 90 feet from the approach end.

The wreckage was examined on January 14, 2005, at the accident site. The main fuselage was oriented on an approximate heading of 060 degrees, and all major components of the airplane were accounted for at the accident site.

A post crash fire consumed the main cabin and a majority of the cockpit area. Both the left and right wings were oriented at a 90-degree angle to the ground, with the leading edges resting on the runway surface.

The outboard section of the left wing leading edge was crushed rearward about 16 inches, with the damage becoming progressively less on the inboard section of the wing. The left wing fuel tank was ruptured. The left wing landing gear assembly was observed in the extended position, and the flap position was verified in the "full flap" position. The left engine came to rest under its respective wing, and was separated from its mounts.

The right wing leading edge sustained inward crushing along the length of the wing. The right wing landing gear assembly was observed in the extended position, and the flap position was verified in the "full flap" position. The right engine came to rest under its respective wing, and was separated from its mounts.

The vertical stabilizer was crushed downward and embedded asphalt was observed in the crushing folds. The upper portion of the rudder was separated at its upper attach point, and bent outward to the right. The lower portion of the rudder remained attached to the vertical stabilizer. The rudder trim tab was deflected to the right of the rudder, approximately 45 degrees.

The left engine propeller blade assembly was located about 10 feet to the right of the main wreckage. The first blade was twisted and displayed chord-wise scoring completely across the upper blade surface and leading edge nicks. The second blade was twisted and displayed chord-wise scoring approximately two-thirds across the upper blade surface and leading edge nicks. The third blade was bent rearward about 4 inches and displayed slight leading edge nicks. The spinner cap was crushed inward.

The right engine propeller blade assembly was located under the right wing, and was separated from the engine. All three blades displayed leading edge nicks, with embedded asphalt media in the nicks. The spinner cap was crushed inward.

An examination of the runway surface revealed impressions and scars from both sets of engine propeller blades and spinners. The impressions correlating to the right engine were consistent with a feathered propeller assembly, while those correlating to the left engine were consistent with a non-feathered propeller assembly that was developing thrust.

The wreckage was recovered and transported to a storage facility in Biddeford, Maine. Further examination, on January 16, 2005, revealed that the remaining fuel in the right wing, which had been exposed to fire, was dark yellow in color. A fuel sample analysis confirmed that the

fuel was Jet A.

An examination of the cockpit area "engine control box" revealed that the left power lever was in the "MAX" position, and the right power lever was in the "MIN" position. The left propeller speed control lever was in the "MAX RPM" position, and the right propeller speed control lever was in the "FEATHER" position. The left fuel condition lever was in the "HI-IDLE" position, and the right fuel condition lever was in the "LO-IDLE" position.

An examination of the engine fire detection panel revealed it had sustained extensive post crash fire damage; however, the left firewall shut-off valve was observed in the "OPEN" position, and the right firewall shut-off valve was observed in the "CLOSED" position.

The engine instrument cluster also sustained extensive post crash fire damage; however, the dual oil pressure indicator gauge needles remained intact. The left engine needle was in the approximate 110-psi position, and the right engine needle was in the approximate 20-psi position.

The right engine, which was partially disassembled, displayed contact signatures between the static and rotating components that were characteristic of the gas generator section being unpowered, and rotating under air loads the time of impact. The power section displayed very light circumferential rubbing, with concurrent static imprint marks, characteristic of the propeller being feathered at the time of impact. There were no any indications of any operational distress or mechanical anomalies to any of the engine components examined, and the large exit duct of the combustion section displayed "normal" flame patterns.

The left engine displayed contact signatures between the static and rotating components characteristic of the engine developing power in a high range at the time of impact.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot at the New Hampshire Office of the Chief Medical Examiner, Concord, New Hampshire. Results indicated the cause of death to be "multiple blunt impact injuries." Toxicological testing was subsequently performed at the FAA Bioaeronautical Research Laboratory, Oklahoma City, Oklahoma, with no pre-existing anomalies noted.

TESTING AND RESEARCH

The right wing fuel sample was dark in color and had an odor inconsistent with Jet A fuel. The right wing fuel sample and a reference sample of Jet A fuel were subjected to a comparative chemical analysis. Similar results were found between the two samples in all categories, except for gum residue, which was about 13 times higher in the right wing sample.

Fuel from the right engine fuel control unit was clear. In addition, there was no debris in the inlet fuel filter.

On January 13, 2005, the airplane was refueled with 60 gallons of Jet A fuel. Fuel load computations indicated that the airplane would have had an estimated 1,000 pounds of fuel on board at Manchester, based on a planning rate of 700 pounds usage per hour.

ADDITIONAL INFORMATION

According to the Embraer EMB-110P1/P2 Bandeirante Flight Manual:

Paragraph 3-3-5, the minimum control speed is 84 knots indicated airspeed.

Paragraphs 3-5-5 and 3-7-5 address an in-flight engine failure or fire, but do not indicate whether to land as soon as practical or as soon as possible.

Excerpts from paragraph 3-7-21, "One-Engine Inoperative Landing and Go-Around" include:

A. BEFORE ONE-ENGINE INOPERATIVE LANDING

Flap - 25 percent.

Propeller control lever - MAX RPM.

Airspeed - Maintain approach speed for 25 percent flaps plus 10 IAS kt.

Landing gear - Down (when committed to landing).

B. FINAL APPROACH

Flap - Down (if required by available runway length and only when committed to landing.)

C. GO-AROUND - (ONLY ABOVE 400 FT AND WITH FLAP 25 PERCENT MAXIMUM)

Power lever - Advance up to the T5, torque, or Ng limits, whichever is first reached.

Maintain directional control.

Flaps - 25 percent.

Speed - Maintain approach speed for 25 percent flaps.

Landing gear - Up after assuring not touching the ground.

Speed - Accelerate to Vyse.

Flaps - 0 percent.

Pilot Information

Certificate:	Airline Transport	Age:	46, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 2	Last Medical Exam:	01/01/2004
Occupational Pilot:		Last Flight Review or Equivalent:	10/01/2004
Flight Time:	2292 hours (Total, all aircraft), 338 hours (Total, this make and model), 2217 hours (Pilot In Command, all aircraft), 120 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Embraer	Registration:	N49BA
Model/Series:	EMB-110P1	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	110-301
Landing Gear Type:	Retractable - Tricycle	Seats:	2
Date/Type of Last Inspection:	08/01/2004, AAIP	Certified Max Gross Wt.:	12500 lbs
Time Since Last Inspection:	139 Hours	Engines:	2 Turbo Prop
Airframe Total Time:	39466 Hours	Engine Manufacturer:	Pratt & Whitney Canada
ELT:	Installed, not activated	Engine Model/Series:	PT6A-36
Registered Owner:	Business Air Inc.	Rated Power:	750
Operator:	Business Air Inc.	Air Carrier Operating Certificate:	Air Cargo; 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:	Night
Observation Facility, Elevation:	EEN, 488 ft msl	Observation Time:	2215 EST
Distance from Accident Site:		Direction from Accident Site:	
Lowest Cloud Condition:		Temperature/Dew Point:	2°C / 1°C
Lowest Ceiling:	Overcast / 100 ft agl	Visibility	1 Miles
Wind Speed/Gusts, Direction:	3 knots, 350°	Visibility (RVR):	
Altimeter Setting:	29.91 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	Fog		
Departure Point:	Bangor, ME (BGR)	Type of Flight Plan Filed:	IFR
Destination:	Swanzey, NH (EEN)	Type of Clearance:	IFR
Departure Time:	2018 EST	Type of Airspace:	

Airport Information

Airport:	Dillant-Hopkins (EEN)	Runway Surface Type:	Asphalt
Airport Elevation:	488 ft	Runway Surface Condition:	Unknown
Runway Used:	02	IFR Approach:	ILS
Runway Length/Width:	6201 ft / 100 ft	VFR Approach/Landing:	None

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:	On-Ground
Total Injuries:	1 Fatal	Latitude, Longitude:	42.898333, -72.237222

Administrative Information

Investigator In Charge (IIC):	Paul R Cox	Adopted Date:	07/30/2008
Additional Participating Persons:	Elaine Summers; TSB Canada; Ottawa, Ontario, Thomas Berthe; Pratt and Whitney Canada; Burlington, VT Jose de Sousa, Jr.; CENIPA; Brasilia, Brazil, Mark Lowell; Embraer; Fort Lauderdale, FL Dennis Delo; FAA/FSDO; Portland, ME		
Publish Date:			
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.nts.gov/pubdms/ .		

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