



# National Transportation Safety Board Aviation Accident Final Report

---

<b>Location:</b>	Portland, OR	<b>Accident Number:</b>	SEA06LA031
<b>Date &amp; Time:</b>	12/24/2005, 0743 PST	<b>Registration:</b>	N753FE
<b>Aircraft:</b>	Cessna 208B	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>		<b>Injuries:</b>	1 Minor
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Non-scheduled		

---

## Analysis

The pilot stated that during takeoff, "after becoming airborne, the airplane quit accelerating and a positive climb rate was not established." He pushed the power lever all the way forward, but did not feel a response from the airplane. Witnesses reported that the airplane became airborne, but failed to gain altitude and struck an antenna array and a fence off the departure end of the runway. The airplane continued across a slough, struck an embankment and came to rest about 900 feet from the departure end of the runway on a golf course located adjacent to the airport. Examination of the airplane revealed no pre-mishap airframe anomalies. Examination of the engine revealed that the compressor and power turbines displayed moderate circular rubbing damage to the blades suggesting engine operation at impact, likely in the low to mid power range. Examination of the airframe and engine revealed no anomalies that would have prevented the engine from producing power prior to impact. The reason for the partial loss of engine power was not determined.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A partial loss of engine power for an undetermined reason during the initial takeoff climb resulting in an in-flight collision with objects.

## Findings

---

Occurrence #1: LOSS OF ENGINE POWER  
Phase of Operation: TAKEOFF - INITIAL CLIMB

### Findings

1. (C) REASON FOR OCCURRENCE UNDETERMINED  
-----

Occurrence #2: FORCED LANDING  
Phase of Operation: DESCENT - EMERGENCY  
-----

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT  
Phase of Operation: TAKEOFF - INITIAL CLIMB

### Findings

2. OBJECT - ANTENNA  
3. OBJECT - FENCE

## Factual Information

On December 24, 2005, at 0743 Pacific standard time, a Cessna 208B, N753FE, experienced a partial loss of engine power and collided with an antenna array and terrain during takeoff initial climb from runway 21 at Portland International Airport, Portland, Oregon. The commercial pilot, the sole occupant, sustained minor injuries. There was substantial damage to the airplane, which was registered to Federal Express Corporation of Memphis, Tennessee and operated by Empire Airlines, Inc., of Hayden, Idaho. Visual meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the 14 CFR Part 135 cargo flight. The flight was originating when the accident occurred and the intended destination was Roseburg, Oregon.

According to information provided by the Portland Air Traffic Control Tower, the airplane was cleared for takeoff on runway 21 from intersection Charlie at 0742. Several of the air traffic controllers on duty at the time witnessed the accident and reported that the airplane became airborne, but failed to gain altitude and struck an antenna array and a fence off the departure end of the runway. The airplane continued across a slough, struck an embankment and came to rest about 900 feet from the departure end of the runway on a golf course located adjacent to the airport.

The pilot reported that "no abnormalities were noticed during power application and take off roll. Engine gauges indicated max power was being produced and acceleration rates seemed normal." He further reported that "at rotation speed (75 knots) the aircraft felt sluggish and slow to respond, but did become airborne." He suspected that the flaps were not down, but upon glancing at the flap position indicator, he saw that they were at the 20 degree take off setting. The pilot stated that "after becoming airborne, the airplane quit accelerating and a positive climb rate was not established." He pushed the power lever all the way forward, but did not feel a response from the airplane.

An FAA inspector and a representative from Cessna Aircraft Company examined the airplane after it was recovered to a hangar on the airport. No pre-mishap anomalies were noted to the airframe. Control cable continuity was established except for the left aileron and left flap cables. The left wing separated from the fuselage, and the left aileron and flap control cables displayed signatures consistent with tension overload; continuity was established from the separations to the cabin controls and to the surface bell cranks. The flap actuator extension measurement indicated a 20 degree flap position. First responders had moved the fuel selector valves to the "OFF" position and recovered 10 to 12 gallons of fuel from the left tank, approximately 87 gallons from the right tank, and 2 gallons from the fuel reservoir tank. Firewall fuel filter screens were clean and free of debris. No sign of fuel contamination was noted. The emergency power lever was found in the "normal" detent. The propeller remained attached to the engine. All propeller blades displayed leading edge damage and chordwise scoring. Approximately 6 inches of the tip of one blade had separated from the blade.

The Cessna representative reported that the empty weight of the airplane was 4,770 pounds. The manifest recorded 1,900 pounds of freight for the flight. Actual weight of the freight was 1,945 pounds. Just prior to the mishap flight, the airplane had been fueled with 60 gallons of Jet-A fuel, bringing the total fuel load to approximately 600 pounds per side. Takeoff weight of the airplane as calculated by the Cessna representative was approximately 8,100 pounds, and the airplane's gross weight was 8,750 pounds. According to the takeoff distance charts in the

aircraft information manual, for the accident conditions, ground roll distance should be approximately 1,190 feet and the total distance to clear a 50 foot obstacle should be approximately 2,095 feet. (The available distance for takeoff on runway 21 from intersection Charlie is approximately 3,300 feet.) Normal takeoff procedure, according to the information manual, calls for 20 degrees of flaps and rotation at 70 to 75 knots indicated airspeed.

The airplane was equipped with a Power Analyzer and Recorder (PAR) manufactured by Avionics Specialties, Inc. of Charlottesville, Virginia. The PAR accumulates, stores and outputs the records of all starts, shutdowns, limit exceedences and other specified data for engine condition check and trend analysis. A Start Record is stored in memory when the NG (compressor speed) Tachometer has reached the ground idle value (51%) and the ITT (interstage turbine temperature) has gone over 200 degrees C. A Shutdown Record is recorded when the NG drops to 12%. An Exceedence Record is recorded when the "Over Limit" Condition has ended. A Power Fail record is made when the engine is running (NG over 51%) and the 28 VDC power to the computer is removed.

The PAR computer was removed from the airplane and sent to Avionics Specialties for a data extraction, which was performed under the supervision of an FAA inspector on January 4, 2006. A Power Fail record indicated that system power was removed from the unit at 07:37:50 on December 24, 2005. (This time was taken from a clock in the unit settable by the operator.) At the time of the power loss, engine ITT was 537 degrees C, engine torque was 615 foot pounds, NG was 69.3%, propeller speed was 629 rpm, fuel flow was 157 pounds per hour, and indicated airspeed was 58 knots.

The engine, a Pratt and Whitney PT6A-114A, S/N 19121, was removed from the airplane and sent to Pratt and Whitney Canada, St Hubert, Quebec, where it was examined under the supervision of an NTSB investigator on January 31 and February 1, 2006. Initial examination of the engine showed no major structural deformation. The compressor and power turbines displayed moderate circular rubbing damage to the blades suggesting engine operation at impact, likely in the low to mid power range. The compressor module, reduction and accessory gearboxes showed no damage and were free turning; they were not disassembled. The fuel pump/fuel control assembly was partially separated from the engine from fracture of the fuel pump mounting flange. The fuel pump drive coupling was fractured in overload. The remaining accessories showed minor deviations from field adjustable parameters during testing; Pratt and Whitney Canada personnel stated that these minor deviations would not have resulted in a loss of engine power.

During the examination at Pratt and Whitney Canada, the compressor discharge air (P3) reference line to the fuel control unit was found loose at the rear firewall coupling location, and the P3 line "B" nut safety wire was found broken. In a written statement, dated July 18, 2006, the operator's Director of Maintenance reported that following the accident, he had attempted to check all of the P3 air lines for tight connections. He was able to verify that all connections were tight with the exception of the connection found loose during the examination at Pratt and Whitney Canada. The Director of Maintenance stated that "later in the investigation once the cowling was off," he did check the connection and found that it was tight. He further stated that he did not see broken safety wire on the fitting. In a written statement dated July 20, 2006, the operator's 208 Fleet Manager reported that during examination of the airplane on December 27, 2005, "the P3 line was removed for access to the compressor screen. The line was reattached finger tight after we inspected the compressor."

## Pilot Information

<b>Certificate:</b>	Flight Instructor; Commercial	<b>Age:</b>	41, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Without Waivers/Limitations	<b>Last Medical Exam:</b>	06/01/2005
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	11/01/2005
<b>Flight Time:</b>	4625 hours (Total, all aircraft), 2450 hours (Total, this make and model), 4580 hours (Pilot In Command, all aircraft), 103 hours (Last 90 days, all aircraft), 35 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	Cessna	<b>Registration:</b>	N753FE
<b>Model/Series:</b>	208B	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	208B0248
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	11/01/2005, AAIP	<b>Certified Max Gross Wt.:</b>	8750 lbs
<b>Time Since Last Inspection:</b>	78 Hours	<b>Engines:</b>	1 Turbo Prop
<b>Airframe Total Time:</b>	7375 Hours	<b>Engine Manufacturer:</b>	Pratt & Whitney Canada
<b>ELT:</b>	Installed, activated, did not aid in locating accident	<b>Engine Model/Series:</b>	PT6A-114A
<b>Registered Owner:</b>	Federal Express Corporation	<b>Rated Power:</b>	675 hp
<b>Operator:</b>	Empire Airlines, Inc.	<b>Air Carrier Operating Certificate:</b>	On-demand Air Taxi (135)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	COEA

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	PDX, 30 ft msl	Observation Time:	0755 PST
Distance from Accident Site:	1 Nautical Miles	Direction from Accident Site:	230°
Lowest Cloud Condition:	Few / 4000 ft agl	Temperature/Dew Point:	8° C / 6° C
Lowest Ceiling:	Broken / 11000 ft agl	Visibility	10 Miles
Wind Speed/Gusts, Direction:	8 knots, 120°	Visibility (RVR):	
Altimeter Setting:	30.01 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Portland, OR (PDX)	Type of Flight Plan Filed:	IFR
Destination:	Roseburg, OR (RBG)	Type of Clearance:	IFR
Departure Time:	0742 PST	Type of Airspace:	

## Airport Information

Airport:	Portland International (PDX)	Runway Surface Type:	Asphalt
Airport Elevation:	30 ft	Runway Surface Condition:	Dry
Runway Used:	21	IFR Approach:	None
Runway Length/Width:	7001 ft / 150 ft	VFR Approach/Landing:	None

## Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Minor	Latitude, Longitude:	45.588611, -122.597500

## Administrative Information

Investigator In Charge (IIC):	Georgia R Struhsaker	Adopted Date:	10/31/2006
Additional Participating Persons:	Jarvis Cochran; FAA FSDO; Hillsboro, OR Richard A Mills; Empire Airlines; Hayden, ID Wayne Gelfand; FedEx; Memphis, TN Marc Gratton; Pratt & Whitney; Quebec, Canada, Steven M Miller; Cessna Aircraft Company; Wichita, KS		
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 <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.