



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	INDIANAPOLIS, Indiana	Incident Number:	CHI96IA170
Date & Time:	May 23, 1996, 20:00 Local	Registration:	N148SK
Aircraft:	Beech 1900D	Aircraft Damage:	Minor
Defining Event:		Injuries:	20 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

Shortly after taking off, the crew of the airplane noted smoke in the cabin, and they returned and landed at the departure airport. Investigation revealed that a bearing in the forward cabin ventilation blower motor had failed. There was evidence that after the bearing had failed, the wires and resistors to the ventilation motor had overheated. The wires were charred and sooted on the blower motor housing. The resistors (for low speed fan operation) showed signs of heat damage. Current limiters were provided to protect the electrical circuit. However, research revealed that the wiring and resistors were not adequately protected in the low speed fan mode.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: failure of a forward cabin ventilation blower motor bearing, which resulted in binding of the blower motor; and inadequate design of the electrical system, which allowed overheating of the electrical circuit and smoke in the cabin of the aircraft.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CLIMB

Findings

1. (C) AIR COND/HEATING/PRESSURIZATION - FAILURE

2. (C) AIR COND/HEATING/PRESSURIZATION - BINDING(MECHANICAL)
3. (C) ELECTRICAL SYSTEM - INADEQUATE
4. (C) ACFT/EQUIP,INADEQUATE DESIGN - MANUFACTURER
5. (C) ELECTRICAL SYSTEM - OVERTEMPERATURE
6. FUSELAGE,CABIN - SMOKE

Factual Information

HISTORY OF FLIGHT

On May 23, 1996, at 2000 central daylight time (cdt), a Beech 1900D, N148SK, experienced smoke in the cabin of the airplane, shortly after departing the Indianapolis International Airport, Indianapolis, Indiana. The 14 CFR Part 121 passenger flight returned to the Indianapolis International Airport, and landed on runway 05L. After stopping on the runway, the 18 passengers and two flight crew members performed an emergency evacuation of the airplane. No injuries were reported by the passengers or the flight crew. VFR conditions existed at the time of the incident. N148SK was operating on an IFR flight plan, with an intended destination of Milwaukee, Wisconsin.

FLIGHT RECORDER

The cockpit voice recorder was removed from the airplane. No useful information was retrieved from the cockpit voice recorder.

FIRE

The wires which control the forward cabin ventilation blower motor were charred and sooted on the blower motor housing. Both resistors which control the blower motor when it is in the low speed mode showed signs of heat damage. The floor immediately under the forward blower motor had a trace of soot on its bottom.

TESTS AND RESEARCH

The investigator in charge (IIC) obtained the forward blower motor, and the current limiter from the incident aircraft. The forward blower motor could not be rotated by hand, and the current limiter for the forward blower motor was tripped. One internal bearing of the forward cabin ventilation blower motor had failed, and was in numerous pieces when the motor was opened.

A review of the aircraft's electrical system, and the blower motor was completed with the manufacturers of the aircraft and the blower motor. It was determined that if either the forward ventilation blower motor or the aft ventilation blower motor for the airplane stalled while in the low speed fan mode, the wires and resistors on the vent blower assembly were insufficiently protected by the current limiter.

The failed blower motor had 2,321 hours total time in service, 2,838 total cycles, and 405 total days of service. There are two different ventilation blower manufacturers. One vent blower manufacturer lists the recommended overhaul time as 1,000 hours. The other vent blower

manufacturer lists the overhaul time as 2,000 hours. The Beechcraft 1900D maintenance manual dated December 22, 1995 recommends to repair or replace the blower motor if it becomes inoperative. The blower motor manufacturers, and the aircraft manufacturer require bearing replacement at the time of blower motor overhaul.

ADDITIONAL INFORMATION

On July 26, 1996, at 1620 eastern standard time a Beech 1900D, N165YV, being operated as Liberty Express Flight 5991, reported smoke in the cockpit after departing from the Jamestown Airport, Jamestown, New York. The crew donned their oxygen masks and deployed the oxygen masks to the passengers. Flight 5991 returned to the Jamestown Airport, and landed. The 17 passengers, one lap child, and 2 flight crew members were uninjured.

The aft blower motor from N165YV was disassembled in Wichita, Kansas, on July 30, 1996. This blower motor showed fire and heat damage similar to the blower motor on N148SK. One internal bearing had failed, the other bearing was worn.

The blower motor from N165YV had been in service 1,597.2 hours, 3,306 cycles, and 318 days

Parties to the investigation were Raytheon Aircraft, and Electromech Technologies.

Pilot Information

Certificate:	Airline transport; Flight instructor	Age:	27, 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:	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	February 1, 1996
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	4300 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	Registration:	N148SK
Model/Series:	1900D 1900D	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Transport	Serial Number:	UE-148
Landing Gear Type:	Retractable - Tricycle	Seats:	21
Date/Type of Last Inspection:	May 21, 1996 Continuous airworthiness	Certified Max Gross Wt.:	16950 lbs
Time Since Last Inspection:	22 Hrs	Engines:	2 Turbo prop
Airframe Total Time:	2321 Hrs	Engine Manufacturer:	P&W
ELT:	Not installed	Engine Model/Series:	PT6A-67D
Registered Owner:	ASTRAL AVIATION, INC	Rated Power:	1279 Horsepower
Operator:	ASTRAL AVIATION	Operating Certificate(s) Held:	Commuter air carrier (135)
Operator Does Business As:	SKYWAY AIRLINES	Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:		Distance from Accident Site:	
Observation Time:		Direction from Accident Site:	
Lowest Cloud Condition:	Unknown	Visibility	
Lowest Ceiling:	Unknown	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/
Wind Direction:	0°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(IND)	Type of Flight Plan Filed:	IFR
Destination:	MILWAUKEE (MKE)	Type of Clearance:	IFR
Departure Time:	00:00 Local	Type of Airspace:	Class B

Airport Information

Airport:	INDIANAPOLIS INTL IND	Runway Surface Type:	Asphalt
Airport Elevation:	797 ft msl	Runway Surface Condition:	Dry
Runway Used:	5L	IFR Approach:	None
Runway Length/Width:	10005 ft / 150 ft	VFR Approach/Landing:	Precautionary landing;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Minor
Passenger Injuries:	18 None	Aircraft Fire:	In-flight
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	20 None	Latitude, Longitude:	39.73072,-86.289581(est)

Administrative Information

Investigator In Charge (IIC):	Boldenow, David
Additional Participating Persons:	MIKE ANDERSON; INDIANAPOLIS , IN JOHN WARD; WICHITA , KS GREGORY M JESSUP; WICHITA , KS
Original Publish Date:	February 1, 1997
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=10120

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