



National Transportation Safety Board

Aviation Accident Final Report

Location:	Aurora, TX	Accident Number:	CEN10FA007
Date & Time:	10/06/2009, 1450 CDT	Registration:	N2TX
Aircraft:	BEECH 100	Aircraft Damage:	Substantial
Defining Event:	Fuel exhaustion	Injuries:	4 Serious
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilot added fuel to the multi-engine airplane prior to departure. While en route to the destination airport, the pilot noted that the fuel gauges indicated that the right main-tank appeared to be almost empty and the left tank appeared half full. The pilot initiated the crossfeed procedure in an effort to supply fuel to both engines from the left main tank. Shortly after beginning the crossfeed procedure, both engines experienced a total loss of power. The pilot notified air traffic control (ATC) and selected a field to perform a forced landing. Prior to touchdown, the right engine produced a surge of power and, in response, the airplane rolled to the left. The surge abruptly ended and the pilot continued the forced landing by lowering landing gear and extending the flaps. The airplane impacted the ground, coming to rest in an open field. A postimpact examination did not reveal any anomalies with the airframe or engine that would have precluded normal operation. Although both fuel tanks were ruptured, the accident scene did not contain a large amount of residual fuel. A small fuel slick was found on the surface of a nearby pond; however, the grass area underneath both wings did not contain dead grass; this would have been expected if there was more than a negligible amount of fuel in the tanks at time of impact.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The loss of engine power due to fuel exhaustion as a result of the pilot's inadequate fuel management.

Findings

Aircraft	Fuel - Fluid level (Cause)
Personnel issues	Incorrect action selection - Pilot (Cause)

Factual Information

HISTORY OF FLIGHT

On October 6, 2009, approximately 1450 central daylight time, a Beech 100, N2TX, was substantially damaged upon impact with terrain following a dual loss of engine power near Aurora, Texas. The commercial pilot and three passengers on-board the airplane were seriously injured. The airplane was owned and operated by a private individual. Visual meteorological prevailed and an instrument flight plan was filed for the Title 14 Code of Federal Regulations Part 91 personal flight. The flight departed Wiley Post Airport (KPWA), Oklahoma City, Oklahoma, approximately 1350 and was destined for Fort Worth Meacham International Airport (KFTW), Fort Worth, Texas.

According to a witness, the airplane's engines were making a "popping" sound during the descent. The propellers were still turning and the airplane was still moving at a "good rate of speed" as it passed through his field of view. This witness did not observe the impact.

On the National Transportation Safety Board (NTSB) Form 6120.1, the pilot reported that the airplane had approximately 260 to 270 gallons of fuel on board the fuel when they departed KPWA. When planning to arrive to KFTW the pilot checked the fuel gauges and noted that the right fuel gauge showed that the right main tank appeared to be "nearly empty" and the left fuel gauge appeared to read "about half full." The pilot initiated the crossfeed procedure to feed both engines from the left main tank. Shortly after beginning the crossfeed procedure, one engine shut down followed by the other engine shutting down. The pilot notified air traffic control (ATC) and selected a field to perform a forced landing. The pilot considered attempting an air start of the engine, but "gave up the attempt" in order to fly the airplane. Shortly before touching down in the field, the right engine produced a surge of power which rolled the airplane to the left. The surge abruptly ended and the pilot continued the forced landing. Prior to touch down, the pilot lowered the landing gear and extended the flaps. The airplane impacted the ground and the pilot could not recall the accident sequence. While waiting for first responders the pilot reported that he may have attempted to secure fuel and electric switches.

A fuel receipt obtained by the fixed base operator (FBO) revealed that the airplane had been fueled with 50 gallons of Jet-A prior to departing KPWA.

PERSONNEL INFORMATION

The pilot, age 64, held a commercial pilot certificate for airplane single engine land, multi-engine land, and instrument airplane. A second class airman medical certificate was issued on July 16, 2009. The pilot's previous flight review was conducted on March 31, 2008 in a Beechcraft B-90.

On the NTSB Form 6120.1, the pilot reported having accumulated approximately 4,120 hours total time and approximately 103 hours in the same make and model. Additionally, the pilot reported having not flown this make and model in the 90 days prior to the accident.

AIRPLANE INFORMATION

The dual turboshaft engine, low-wing, retractable gear airplane, serial number BE-103, was manufactured in 1981. It was powered by two supplemental type certificate (STC) modified TPE331-6-511B turboshaft engines each rated at 715 horsepower. According to entries found in

the engine log book, both engines were installed on the airplane on May 21, 2001. The airplane completed a Phase III and Phase IV inspection on May 22, 2007, at a recorded total airframe time of 6,285 hours. On August 15, 2008, Hawker Beechcraft Services completed a Phase I through Phase IV inspections on the airplane at a total airframe time of 6,563.4 hours and Hobbs meter time of 831.4 hours. During these inspections, the airplane was deemed unairworthy by the repair facility and entries were placed in the airframe logbook and both engine logbooks. At the time of the accident, the airplanes Hobbs meter read 1,063.7 hours.

METEOROLOGICAL INFORMATION

At 1453, an automated weather reporting facility at the Fort Worth Alliance Airport (AFW), located 13 nautical miles to the south-east of the accident site reported wind from 020 degrees at 12 knots gusting to 20 knots, visibility 10 miles, few clouds at 1,000 feet, ceiling overcast at 1,600 feet, temperature 21 degrees Celsius (C), dew point 16 C, and a barometric pressure of 29.90 inches of Mercury.

WRECKAGE AND IMPACT INFORMATION

An inspection of the wreckage was conducted by the members of the National Transportation Safety Board, Federal Aviation Administration (FAA), Hawker Beechcraft Corporation, and Honeywell Aerospace. Initial ground scars were consistent with the airplane impacting terrain on a 210 magnetic heading. The main wreckage came to rest in an open field located at an elevation of 740 feet mean sea level. The fuselage was generally aligned with 120 degrees. The nose of the airplane was crushed upwards and to the right. The left side of the fuselage was impact damaged and displayed signs of gouging. The left wing was separated from the fuselage and was found in a nearby body of water along with the left horizontal stabilizer, and both engines. The right wing was intact; however the right engine was separated at the firewall. The landing gear and flaps appeared to be configured for landing.

Although both fuel tanks were ruptured, the accident scene did not contain a large amount of residual fuel. A small fuel slick was found on the surface on the nearby farm pond. The area underneath both wings did not present signs of grass kill.

TEST AND RESEARCH

TPE331-6-511B turboshaft engines

Both engines were shipped to and examined at National Flight Services, Toledo, Ohio, under the oversight of the National Transportation Safety Board (Safety Board). Neither engine could be run due to impact damage and water intrusion. Both engines' fuel system were found intact prior to disassembly. The left engine contained approximately 150 ml of residual fuel throughout its systems. Mud was packed into the first stage compressor impeller. Rotational scoring was found on the second stage compressor. There were no anomalies detected with the right engine. The right engine contained approximately 370 ml of fuel. The torsion shaft was found fractured approximately 7.25 inches forward of the aft end. The first stage compressor section had rotational scoring and blades bent the opposite direction of travel. The second stage compressor section had rotational scoring. The second stage and third stage turbine sections had evidence of rotational scoring and metal spray. There were no anomalies detected with the right engine.

Fuel Control Units (FCUs)

Both FCUs were removed from the TPE331-6-511B engines and examined at Woodward

Governor Company, Rockford, Illinois, under the oversight of the Safety Board. Of note, the right engine's FCU had been set to 0.65 specific gravity (lower than the specific gravity of Jet-A fuel). No further anomalies were detected with either FCU.

Constant Speed Propeller Governor

Both propeller governors were removed from the TPE331-6-511B engines and examined at Woodward Governor Company, Rockford, Illinois, under the oversight of the Safety Board. Both governors were found to be modified to allow for higher operating RPMs. No further anomalies were detected with either governor.

McCauley Propeller

Both propellers were shipped and examined at McCauley Propeller Systems, Wichita, Kansas, under the oversight of the Safety Board. No anomalies were detected with either propeller.

Beech Fuel Panel and fuel probes

The airplane's fuel panel and fuel probes were removed and examined at Hawker Beechcraft Corporation, Wichita, Kansas, under the oversight of the FAA. Current was applied to the system to simulated current from the fuel probes. The left hand fuel gauge displayed 720 pounds of fuel regardless of current applied to the system. The right hand fuel gauge was found to operate, but contained a range of errors from 65 pounds below to 20 pounds over the expected amount.

Left Fuel Gauge

The left fuel gauge was removed and examined at Parker-Hanafin, Smithtown, New York, under the oversight of the FAA. The internal components were examined and revealed signatures consistent with impact damage that kept the display's needle from operating normally. Once documented and reset, the gauge operated normally. No anomalies were detected with the gauge.

ADDITIONAL INFORMATION

Crossfeed Procedure

Prior to both engines experiencing a total loss of engine power, the pilot attempted to fuel both engines utilizing the crossfeed procedure. Under the Fuel section of the Pilot Operating Handbook's Section III Emergency Procedures is a Caution which states:

"The crossfeed is to be used for one-engine-inoperative operations only. Do not feed both engines simultaneously from one side."

This Caution is not printed on the airplane's fuel panel, instead a Caution states:

"Turn Aux Trans Off during crossfed (side being fed)."

This Caution closely resembled the Caution located in the Section VII System Description.

History of Flight

Prior to flight	Preflight or dispatch event
Enroute	Fuel exhaustion (Defining event) Loss of engine power (total)
Emergency descent	Off-field or emergency landing
Landing-flare/touchdown	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Commercial	Age:	64, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	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:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	07/16/2009
Occupational Pilot:		Last Flight Review or Equivalent:	03/31/2008
Flight Time:	(Estimated) 4120 hours (Total, all aircraft), 103 hours (Total, this make and model), 4010 hours (Pilot In Command, all aircraft), 47 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	BEECH	Registration:	N2TX
Model/Series:	100	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	BE-103
Landing Gear Type:	Retractable - Tricycle	Seats:	11
Date/Type of Last Inspection:	08/15/2008, Condition	Certified Max Gross Wt.:	
Time Since Last Inspection:	232.3 Hours	Engines:	2 Turbo Prop
Airframe Total Time:	1063.7 Hours at time of accident	Engine Manufacturer:	National Flight Services Inc
ELT:	Installed	Engine Model/Series:	TPE331-6-511B
Registered Owner:	On file	Rated Power:	1000 lbs
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	
Observation Facility, Elevation:	KAFW	Distance from Accident Site:	13 Nautical Miles
Observation Time:	1453 CDT	Direction from Accident Site:	118°
Lowest Cloud Condition:	Few / 1000 ft agl	Visibility	10 Miles
Lowest Ceiling:	Overcast / 1600 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	12 knots / 21 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	20°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.9 inches Hg	Temperature/Dew Point:	21°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Oklahoma City, OK (PWA)	Type of Flight Plan Filed:	IFR
Destination:	Fort Worth, TX (FTW)	Type of Clearance:	IFR
Departure Time:	1350 CDT	Type of Airspace:	

Airport Information

Airport:	Runway Surface Type:
Airport Elevation:	Runway Surface Condition:
Runway Used:	IFR Approach:
Runway Length/Width:	VFR Approach/Landing:

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	3 Serious	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Serious	Latitude, Longitude:	(est)

Administrative Information

Investigator In Charge (IIC):	Jason T Aguilera	Report Date:	03/16/2011
Additional Participating Persons:	Chip Wood; FAA FSDO; Fort Worth, TX Tim Rainey; Hawker Beechcraft Corporation; Wichita, KS Marlin Kruse; Honeywell; Phoenix, AZ Lawrence Lowry; National Flight Services Inc.; Toledo, OH Thomas Knopp; McCauley Propeller Systems; Wichita, KS Steve Krugler; Woodward Governor Company; Rockford, IL		
Publish Date:	03/16/2011		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=74863		

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. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).