



National Transportation Safety Board Aviation Accident Final Report

Location:	WILLIAMSTOWN, MA	Accident Number:	NYC94FA148
Date & Time:	08/04/1994, 1605 EDT	Registration:	N7GA
Aircraft:	BEECH A100	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal

Flight Conducted Under: Part 91: General Aviation - Positioning

Analysis

THE AIRPLANE HAD UNDER GONE ROUTINE MAINTENANCE FOR SLOW ACCELERATION ON THE RIGHT ENGINE. MAINTENANCE RECORDS REVEALED THE FUEL CONTROLS WERE CHANGED FROM THE RIGHT ENGINE TO THE LEFT ENGINE. THE AIRPLANE WAS RELEASED BACK TO THE PILOT FOR SERVICE, AND HE DEPARTED FOR HIS HOME STATION. SEVERAL WITNESSES SAW THE AIRPLANE AFTER TAKEOFF AT A LOW ALTITUDE, AND AT A SLOW SPEED. THE AIRPLANE TURNED LEFT, AND THE LEFT WING STRUCK THE GROUND. TWO WITNESSES SAW THE AIRPLANE PASS BY THEM AT A LOW ALTITUDE, AND WROTE, '...AT THIS POINT WE COULD SEE THE LEFT (PORT) ENGINE PROPELLER WAS TURNING VERY SLOWLY. YOU COULD ACTUALLY SEE THE INDIVIDUAL BLADES OF THE PROPELLER TURNING.' A COMPLETE DISASSEMBLY OF BOTH ENGINES, REVEALED NO DISCREPANCIES OTHER THAN IMPACT, AND POST IMPACT FIRE DAMAGE. DISASSEMBLY OF THE LEFT PROPELLER INDICATED THAT THE PROPELLER BLADES WERE AT OR NEAR FEATHER AT IMPACT. THE PILOT HAD A TOTAL OF 106 FLIGHT HOURS IN BEECH A100 AIRCRAFT, ALL IN THE 90 DAYS PRIOR TO THE ACCIDENT, AND 56 HOURS IN THE 30 DAYS PRIOR TO THE ACCIDENT.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's failure to maintain minimum control speed after an undetermined loss of engine power, which resulted in an inadvertent stall at too low of an altitude to allow recovery.

Findings

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

Findings

1. 1 ENGINE
2. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings

3. (C) AIRSPEED(VMC) - NOT MAINTAINED - PILOT IN COMMAND
4. (C) STALL - INADVERTENT - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On August 4, 1994, about 1605 eastern daylight time, a Beech A100, N7GA, registered to Westchester Air Inc., and piloted by David M. Becker, collided with the ground after takeoff from Harriman-And-West Airport, near Williamstown, Massachusetts. The airplane was destroyed, and the pilot was fatally injured. Visual meteorological conditions prevailed and an IFR flight plan had been filed. The flight was being conducted under 14 CFR 91, as a positioning flight.

Several witnesses saw the airplane, after take off, flying to the left of the runway centerline, at a low altitude, and at a slow speed. The airplane was seen turning left prior to striking the ground with the left wing.

An aircraft technician, standing at the airport, watched N7GA take off and wrote:

...airplane took off as normal....about 100 feet above runway, I heard at least one prop change pitch and saw the wing drop and the nose come up and the plane sway towards his left...the landing gear then appeared to go up, but he still was not climbing...the plane took a left turn and started heading behind a hill....

Several of the witnesses agreed that the engine sounds were not the same as the sounds they were accustomed to hearing. They described the engine sounds as being, "loud and surging," "unusually loud," and that the engines were, "not running properly."

Two witnesses sitting in their backyard wrote:

...we first heard and saw the plane flying very low just above the trees to the northeast...the plane was flying much slower and lower than normal and it was laboring to gain altitude...visual size of the plane appeared to be much larger...indicating that it was closer to us than planes we see in the normal flight path. We have watched planes take off from the airport for 30 years...the plane was about level but to the north of a group of willow trees to the NNE. At this point we could see the left (port) engine propeller was turning very slowly. You could actually see the individual blades of the propeller turning. The plane continued without gaining much altitude...we then heard the engine briefly surge and throttle-up. The plane then veered to the southwest [left]. At this point we lost visual contact....

The airplane had undergone a 150 hour inspection and routine maintenance for slow acceleration on the right engine. According to maintenance records the inspection was completed, and the fuel controls were changed from the right engine to the left engine. The airplane was released back to the pilot for service, and he departed for his home station.

The accident occurred during the hours of daylight approximately 42 degrees, 41 minutes north, and 73 degrees, 11 minutes west.

PERSONNEL INFORMATION

Mr. David M. Becker held Airline Transport Pilot Certificate, No. 1863288, with multiengine, single engine land, and instrument airplane ratings. Mr. Becker was type rated in the Cessna500, and LearJet and was also a ground instructor for advanced instruments.

Mr. Becker was issued a First Class Airman Medical Certificate on June 1, 1994, with no

limitations.

Company records showed Mr. Becker's total flight hours at the time of the accident were 10,200, of which 106 hours were in Beechcraft A100 aircraft. According to company records, Mr. Becker had flown 106 hours in N7GA in the 90 days prior to the accident and 56 hours in N7GA in the 30 days prior to the accident. Mr. Becker flew the airplane two days before the accident and did not fly it again until departure from Williamstown the day of the accident.

On May 21, 1994, Mr. Becker satisfactorily completed a proficiency check in a Beech 200, simulator, at Flight Safety Inc., Wichita, Kansas.

AIRCRAFT INFORMATION

In a telephone conversation, on August 18, 1994, Mr. Jeff Beisiegel, a mechanic, at Turboprop, Inc., told the NTSB investigator-in-charge, that he was one of the mechanics who worked on N7GA. Mr. Beisiegel submitted a written statement, in which he wrote:

[The] initial pilot squawk [was] "Engines need rigging"...I did the initial engine run before inspection began...the following are the squawks...right engine slow to accelerate...power levers mismatched...blade angles high (ground and flight)...unable to reach max torque...max N2 RPM low- 30 RPM left, 50 RPM Right....

According Mr. Beisiegel, he "swapped the left and right fuel controls." At the same time he, "adjusted the slow accelerating fuel control," which was now on the left side, from "the +1 to the +3 max allowable setting." He also set the engine controls to their static dimensions as "found in the Beech KA-100 Maintenance Manual, Chapters 61 and 76."

Mr. Beisiegel, told the IIC, that on the day of the accident the engines on N7GA were ground tested and ran for approximately "1 hour." The test was done using the "Beech Manual," and "no instrument readings were recorded." In addition no power run or "condition run" was performed. According to Mr. Beisiegel, the propeller "barrel nut" was adjusted in the hanger, and the propeller "beta nuts" were adjusted while the airplane was running.

On the morning of August 4, 1994, the same day as the accident, the engines were ground tested, and final adjustments to the engine rigging was made. Mr. Beisiegel wrote:

...the slow acceleration problem stayed with the fuel control but was now on the left...acceleration was greatly improved but still slower than the right engine. Left low Ng was adjusted to 60% (Right Ng O.K. at 61%). Max N2 RPM was adjusted to 2200 RPM. Prop blade angles at 2200 RPM were adjusted to the charts next; ground idle first, flight idle second. Left and right engine part-power checked and adjusted at this time. Only able to reach 95.3% Ng on right with part-power stops in place. (97.1 target) Red line torque could not be made at this setting. (50-75 ft/lbs low of red line torque)...adjusted left power lever input arm to match up power levers. (At this time the left engine power lever input arm was replaced due to wear in the hole of the arm. Replaced with new arm)... One last run was made verifying the numbers, torques etc. Engines were safety wired and cotter pinned as required.

Under the supervision of the FAA, a test was conducted on the propeller system to determine, if the system was adjusted or rigged improperly, could the proximity/magnetic switch, and flight idle stop fail in flight.

To facilitate the test and to simulate an engine run, a similar Beech A100, was used. Air was

used instead of oil, the airplane was placed on jacks, and the propeller beta nuts were adjusted two turns outward.

According to the FAA's report, the results of the test indicated that it was possible for the propeller proximity/magnetic switch, and flight idle stop to fail in flight, and the propeller blades go to the "feathered position."

The propeller circuit breaker and proximity/magnetic switch on N7GA were damaged at impact, and were not functionally tested. The post crash fire precluded any determination of the position of the propeller governor circuit breaker.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on Mr. David Becker, on August 4, 1994, at the Medical Examiner's Office, in Pittsfield, Massachusetts, by Dr. Daniel Carter.

The toxicological tests were conducted at the Federal Aviation Administration's (FAA), Toxicology and Accident Research Laboratory, Oklahoma City, Oklahoma and revealed, "... no drugs or alcohol where found."

WRECKAGE AND IMPACT INFORMATION

The wreckage was examined at the accident site on August 5-6, 1994. The airplane impacted in an open field 1.2 miles from the airport, on a heading from the airport of 273 degrees. The wreckage path was on a heading of 200 degrees. At the beginning of the wreckage path was a ground scar approximately 18 inches deep and 2 feet long. Found in the ground scar was a wing tip with a red navigation light lens still attached. The wreckage path continued on a 200 degree heading for 134 feet.

The left engine and propeller were found disconnected from the nacelle, 73 feet from the first ground scar. Sections of the left wing (tip and flap) were found 88 feet from the first ground scar.

The main wreckage came to rest 134 feet from the first ground scar, with the nose of the airplane heading 107 degrees. The right wing folded under the fuselage, and was resting on the left side of the fuselage. The right engine and propeller were still attached to the wing. The entire fuselage, except for the tail, was completely destroyed by fire.

Control continuity was established to all the flight controls, through tracing cables and rods.

The engines and propellers were removed from the accident site for further examination.

TEST AND RESEARCH

Both engines were disassembled under the supervision of the NTSB at Pratt and Whitney (P&W) Canada's facility Longueuil, Quebec, on September 7-9, 1994.

Left Engine (S/N-50241)

The external examination of the engine revealed impact and fire damage. The reduction gearbox forward housing had separated from the engine, and displayed impact damage on the external cases.

Disassembly of the engine revealed that rubs and machining were displayed on the gas generator section, centrifugal impeller and shroud, the compressor turbine disc and interstage baffle, as a result of contact due to impact loads, and the distortion of the external case.

Static imprint marks were observed on the power turbine section, power turbine guide vane, downstream (Note: relation to gas path flow from compressor inlet to exhaust) side due to contact with the power turbine. The external case, in the area of the power turbine was distorted as a result of impact damage.

A complete disassembly of the left engine revealed no discrepancies other than impact and post impact fire damage.

The left engine fuel control unit (FCU) was not functionally tested due to fire and impact damage. The maximum Ng adjustment was found adjusted to the limit of its authority. The FCU was disassembled and no discrepancies were found.

Right Engine (S/N-50240)

The external examination of the engine revealed impact and fire damage. Both the power section and the gas generator section of the right engine displayed internal rotational damage.

Disassembly of the engine revealed that rubs and machining were displayed by the gas generator section centrifugal impeller and shroud, the compressor turbine disc and interstage baffle, as a result of axial contact due to impact loads, and the distortion of the external case.

The power turbine blade tips and shroud displayed circumferential rubs, and external case distortion.

A complete disassembly of the right engine revealed no discrepancies other than impact and post impact fire damage.

The right engine fuel control unit (FCU) was not functionally tested due to fire and impact damage. The maximum Ng adjustment was found adjusted to the limit of its authority. The FCU was disassembled and no discrepancies were found.

Both propellers were disassembled at the request of the NTSB, and under the supervision of the FAA at Hartzell Propeller's facility Piqua, Ohio, on November 10, 1994.

Impact damage to the left propeller revealed that the propeller was at or near feather at impact. Due to a lack of definitive impact signatures on the right propeller, the condition of the propeller at impact was inconclusive.

Left Propeller (Hub S/N EA-68)

External examination revealed that the propeller was intact and in the feathered position.

All four blades remained attached to the hub. The propeller blade displayed minimal rotation damage. No impact related leading edge damage was noted on any of the blades, including the rubber deice boots.

The propeller was cycled with air pressure from the feather position to approximately mid-range. Further movement was restricted by interference and contact with the bent L1 (left #1) link arm preventing further movement towards low pitch.

Teardown of the propeller revealed that the pitch change mechanism, was received in the feather position. The guide ring was deformed rearward between all four guide rods. All four guide rods were bent in the direction of propeller rotation. The piston was twisted.

Externally the piston did not show any discrepancies. No impact marks were found on the interior wall of the piston. Feather stop imprints were noted on the interior nose.

Examination of the cylinder revealed score marks on the exterior side wall of the cylinder both in the high and low pitch range.

The feathering spring assembly was found intact. Both sets of two feather stop screws displayed impact damage and were distorted.

Right Propeller (Hub S/N EA-64)

External examination revealed that all four of the propeller blades were burned. The fire damage was so extensive that it was not possible to distinguish between bends and twists caused by impact or the post impact fire. None of the blades showed any sign of rotation within the clamps, except blade R1 which had rotated in the clamps about 30 degrees towards the low pitch direction. There was not much damage to the link arms and link pins.

All four blades remained attached to the hub. The outboard ends were heat distressed and molten at various blade stations. Blade butt end signatures did not indicate a significant amount of impact deformation, hence, determination of blade angle, and blade position was not obtained.

Propeller cycling was not attempted due to impact damage.

The pitch change mechanism was intact. The piston measured 1.483 inches from the front of the guide collar. The "shiny areas (no fire damage) on the guide rods corresponded to a guide rod position with the low stop collar forward of its normal spring loaded position almost against the hub when the fire damage occurred.

Externally the piston was blackened by heat distress. There were no interior wall impact marks. The feather stop screw indent on the interior nose were similar in depth and intensity. There were no discrepancies found with the piston "o" ring.

Except for heat damage there were no discrepancies found with the link arms, clamps, counterweights, cylinder, feather spring, and pitch change rods.

ADDITIONAL INFORMATION

Minimum control speed (V_{mc}) for the Beech A100 is 85 knots. V_{mc} is defined in Federal Air Regulation as the minimum control speed at which it is possible to recover directional control of the airplane within 20 degrees heading change, and thereafter maintain straight flight, with not more than 5 degrees of bank, if one engine fails suddenly.

Federal Aviation Administration (FAA), Advisory Circular 61-21A, Flight Training Handbook, states:

With full power applied to the operative engine, as airspeed drops below V_{mc}, the airplane tends to roll as well as yaw into the inoperative engine. This tendency is greater as the airspeed is further reduced...If a stall should occur in this condition, a violent roll into the dead engine may be experienced. Such an event occurring close to the ground could be disastrous. This may be avoided by maintaining a speed above V_{mc} at all times during single-engine operations.

FAA, Advisory Circular 61-21A, also states:

P-factor is present in multiengine airplanes just as it is in single-engine airplanes...P-factor is caused by dissimilar thrust of the rotating propeller blades when in certain flight conditions. It is the result of the downward moving blade having a greater angle of attack

than the upward moving blade when the relative wind striking the blades is not aligned with the thrust line. In most U.S. designed [airplanes], both engines rotate to the right, when viewed from the rear...This asymmetric propeller blade thrust or "P-factor," results in a center of thrust at the right side of each engine...The turning [or yawing] force of the right engine is greater than the left engine...Thus, when the right engine is operative and the left engine is inoperative, the turning force is greater than in the opposite situation of a "good" left and a "bad" right engine. In other words, directional control may be difficult when the left engine [critical engine] is suddenly made inoperative.

Mr. William Kelly, a certified flight instructor and test pilot, in an article published in the October 15, 1992, edition of the publication, Aviation Safety, wrote:

Vmc test criteria include: (1) max power on "going" engine; (2) windmilling prop on the dead engine...; (3) landing gear "up"; (4) flaps in the takeoff position; (5) a maximum of 5 degree bank into the "good" engine; (6) less than 150 pound of rudder force...by maintaining wings level, the Vmc speed rises substantially, possibly as much as 20-25 knots.

According to the Beech, King Air A100 Airplane, Flight Manual, the best single engine rate of climb speed is "120 knots." The elevation at the crash was 564 feet, and the reported temperature at the time of the accident was 85 degrees F. At an estimated airplane weight of 10,500 pounds, with one engine inoperative, the rate of climb should be 550 feet per minute. At an estimated airplane weight of 11,000 pounds, one engine inoperative, the rate of climb should be 480 feet per minute.

The airframe was released to the owner on August 5, 1994. The engines were released to the owner's representative, Mr. John Steidinger on September 9, 1994. The propellers were shipped to Mr. Steidinger, by Hartzell.

Pilot Information

Certificate:	Airline Transport	Age:	50, 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:	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last Medical Exam:	06/01/1994
Occupational Pilot:	Last Flight Review or Equivalent:		
Flight Time:	10200 hours (Total, all aircraft), 106 hours (Total, this make and model), 106 hours (Last 90 days, all aircraft), 56 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	BEECH	Registration:	N7GA
Model/Series:	A100 A100	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	B-119
Landing Gear Type:	Retractable - Tricycle	Seats:	11
Date/Type of Last Inspection:	08/04/1994, AAIP	Certified Max Gross Wt.:	11500 lbs
Time Since Last Inspection:	1 Hours	Engines:	2 Turbo Prop
Airframe Total Time:	10426 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	PT-6-A-28
Registered Owner:	WESTCHESTER AIR INC.	Rated Power:	680 hp
Operator:	WESTCHESTER AIR INC.	Air Carrier Operating Certificate:	On-demand Air Taxi (135)
Operator Does Business As:		Operator Designator Code:	APGA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	, 0 ft msl	Observation Time:	0000
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear / 0 ft agl	Temperature/Dew Point:	28° C / 18° C
Lowest Ceiling:	None / 0 ft agl	Visibility	1.75 Miles
Wind Speed/Gusts, Direction:	11 knots, 230°	Visibility (RVR):	0 ft
Altimeter Setting:	29 inches Hg	Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:		Type of Flight Plan Filed:	IFR
Destination:	WHITE PLAINS, NY (HPN)	Type of Clearance:	IFR
Departure Time:	1605 EDT	Type of Airspace:	

Airport Information

Airport:	HARIMAN-AND-WEST (2B6)	Runway Surface Type:	Asphalt
Airport Elevation:	564 ft	Runway Surface Condition:	Dry
Runway Used:	29	IFR Approach:	
Runway Length/Width:	4300 ft / 100 ft	VFR Approach/Landing:	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	ALAN J YURMAN	Adopted Date:	08/23/1995
Additional Participating Persons:	JOHN D CHERIS; WINDSOR LOCKS, CT RICHARD I BUNKER; BOSTON, MA JAMES E STERMER; WICHITA, KS GIANCARLO MASCIOTRA; LONGUEUIL, QC		
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/ .		

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.