



National Transportation Safety Board Aviation Accident Final Report

Location:	Hayward, CA	Accident Number:	WPR09LA451
Date & Time:	09/16/2009, 1215 PDT	Registration:	N726CB
Aircraft:	Raytheon Aircraft Company B200	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	1 None
Flight Conducted Under:	Part 91: General Aviation - Business		

Analysis

The airplane just had undergone a routine maintenance and this was planned to be the first flight after the inspection. During the initial climb, the pilot observed that the airplane was drifting to the left. The pilot attempted to counteract the drift by application of right aileron and right rudder, but the airplane continued to the left. The pilot reported that, despite having both hands on the control yoke, he could not maintain directional control and the airplane collided into a building. The airplane subsequently came to rest on railroad tracks adjacent to the airport perimeter.

A post accident examination revealed that the elevator trim wheel was located in the 9-degree NOSE UP position; normal takeoff range setting is between 2 and 3 degrees NOSE UP. The rudder trim control knob was found in the full left position and the right propeller lever was found about one-half inch forward of the FEATHER position; these control inputs both resulted in the airplane yawing to the left.

The pilot did not adequately follow the airplane manufacturer's checklist during the preflight, taxi, and before takeoff, which resulted in the airplane not being configured correctly for takeoff. This incorrect configuration led to the loss of directional control immediately after rotation. A post accident examination of the airframe, engines, and propellers revealed no anomalies 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 failure to maintain directional control after takeoff. Contributing to the accident was the pilot's inadequate preflight and failure to follow the airplane manufacturer's checklist to ensure that the rudder trim control and right propeller control lever were positioned correctly.

Findings

Aircraft	Directional control - Not attained/maintained (Cause)
Personnel issues	Preflight inspection - Pilot (Factor) Use of checklist - Pilot (Factor)

Factual Information

HISTORY OF FLIGHT

On September 16, 2009, about 1215 Pacific daylight time, a Raytheon Aircraft Company B200, N726CB, sustained substantial damage after impacting terrain while maneuvering during initial climb at the Hayward Executive Airport (HWD), Hayward, California. The commercial pilot, the sole occupant, was not injured. Visual meteorological conditions prevailed for the local flight, which was operated in accordance with 14 Code of Federal Regulations (CFR) Part 91, and no flight plan was filed. The flight was originating at the time of the accident, with its destination being the San Carlos Airport (SQL), San Carlos, California.

In a report submitted to the Safety Board investigator-in-charge (IIC), the pilot reported that this was the first flight after maintenance had been performed on the airplane. The pilot stated that during the takeoff roll on runway 28R there were no warning lights when he started down the runway and that both engines were delivering full power. The pilot further stated, "...after the takeoff the airplane started drifting left. I applied right aileron and right rudder. I was still drifting left and had full right aileron. I landed at the edge of the airport."

In a personal interview conducted by a Federal Aviation Administration (FAA) aviation safety inspector, the pilot revealed that when he was 100 feet off the ground the airplane started to veer to the left, and that the airspeed was between 95 and 100 [knots]. The pilot stated that he then "kicked in 'hard' right rudder," and at this point the engine power seemed normal. The pilot added that he had both hands on the yoke until the airplane crashed. The inspector reported that when asked about the use of the airplane's checklist, the pilot stated, "Yes, but during taxi."

A FAA inspector who responded to and examined the accident site reported that the airplane initially struck an industrial building (off airport property) near the top of the structure with its left main landing gear [tire], and that the tire mark was between 20 feet to 30 feet in length. The inspector stated that wing parts were also located on top of the building. The inspector added that a second industrial building, which was located about 40 feet to 50 feet west of the first building, was also struck by the airplane. The inspector reported that it appeared that the aircraft was "riding" along the top edge of the building with the left engine striking the top side of the building. The right wing was low, and a collision occurred with the right main [landing] gear against a railroad car parked immediately beside the building. The inspector stated that this collision turned the aircraft 360 degrees, almost immediately causing the aircraft to slide off the end of the railroad car. The inspector added that the "tail-first flight" ended with the aircraft sliding backwards on [the] railroad tracks until it came to an abrupt stop.

PERSONNEL INFORMATION

A review of FAA records revealed the 37 year old pilot possessed a commercial pilot certificate for airplane land, instrument airplane, rotorcraft-helicopter, and a private pilot certificate for airplane single-engine land. The pilot's most recent second-class FAA airman medical certificate was issued on October 22, 2009, without limitations. The pilot revealed that his most recent biennial flight review was conducted on February 24, 2009 in a King Air B200 airplane. The pilot reported a total flight time of 2,913 hours, of which 1,707 hours were in the same make and model as the accident airplane.

AIRCRAFT INFORMATION

The airplane was a 2001 Raytheon Aircraft Company B200, serial number BB-1750, which had accumulated a total engine and airframe time of 1,229.6 hours at the time of the accident. The airplane underwent its most recent Continuous Airworthiness inspection on September 10, 2009. The accident flight was the first flight subsequent to the completion of this inspection.

In a telephone conversation with the IIC, the service manager of Mather Aviation, LLC, of Hayward, California, the firm that performed the most recent maintenance on the accident airplane, the maintenance work performed on the airplane was described as “routine maintenance.” The service manager added that the airplane was not brought into their facility because of “some other problem” that had just recently occurred. When asked by the IIC if he could recall anyone having repositioned any of the airplane’s trim controls while maintenance was being performed on the airplane, he replied that the trim controls were never touched by any of his maintenance personnel who worked on the airplane. The service manager stated that the trim controls were in the same position when the airplane was returned to the owner as they were when it was delivered to their facility for maintenance.

As part of the most recent maintenance that was performed on the airplane, the service manager reported that a 1,200 hour throttle stop pin inspection (throttle catch gate) was performed. In a statement provided by Mather Aviation’s Director of Quality Assurance, the inspection was accomplished by an alternate means than is described in the Hawker Beechcraft Corporation Super King Air 200 Series Maintenance Manual, Chapter 76-00-00, page 211. The Director of Quality Assurance stated, “It is Mather Aviation policy to not disturb flight controls for access to areas to be inspected, unless no other means of access is available. In this case (power lever stop pin wear inspection) it is our practice to use a boroscope through the throttle lever arm cutouts on the pedestal. This affords a better view of the pin and provides a better view of the contact area to gauge the wear than by visual reference with the flashlight and mirror after opening the pedestal side panel and disturbing the trim wheel and rigging as is described in the maintenance manual.”

According to the Hawker Beechcraft maintenance manual, the description for the inspection of the power lever detent pin is as follows:

- a. Disconnect all electrical power.
- b. Remove the pilot’s seat assembly from the airplane.
- c. Remove the screw and washer that secure both the elevator trim tab control wheel and the left end of the engine control lever pivot shaft to the left side of the pedestal. Index the position of the elevator trim tab control wheel for later installation.
- d. Remove the upholstery panel from the left side of the pedestal.
- e. Using a mirror and flashlight, inspect the upper power lever detent pin (Ref. Figure 206) on each power lever for excessive wear in the groove where the detent pin travels on the idle/reverse stop assembly between the levers. Wear of the pin’s diameter by a 1/3 or more is considered excessive.
- f. If excessive wear of the pin is indicated, the power lever assembly must be replaced as follows:

METEOROLOGICAL INFORMATION

At 1154, about 21 minutes prior to the accident, the HWD Automated Surface Observing

System (ASOS), reported wind 290 degrees at 7 knots, visibility 10 miles, sky clear, temperature 21 degrees Celsius (C), dew point 14 degrees C, and an altimeter setting of 30.08 inches of Mercury.

At 1236, about 21 minutes after the accident, the HWD ASOS issued a Special weather observation, which reported wind 290 degrees at 7 knots, visibility 4 miles in haze, few clouds at 900 feet, temperature 20 degrees C, dew point 14 degrees C, and an altimeter setting of 30.08 inches of Mercury.

WRECKAGE AND IMPACT INFORMATION

An on-scene inspection of the wreckage by FAA aviation safety inspectors revealed that the airplane came to rest on a set of industrial railroad tracks, with the airplane's fuselage oriented on a 45-degree angle across the tracks and on a magnetic heading of about 150 degrees. The tail section of the airplane, which remained intact, came to rest up against the airport's sound boundary fence, with a partial section of the metal fence separated from the support fence posts. The main wreckage was located about 4,420 feet from the point of the initial takeoff roll on a magnetic heading of about 292 degrees, and about 520 feet southwest of the runway 10R displaced threshold, on a magnetic heading of about 228 degrees.

An examination of the wreckage site revealed that the entire right side and forward left side of the airplane sustained extensive thermal damage. Both engines, the nose gear and right main landing gear had separated, while the empennage and both wings remained attached to the airplane's fuselage at all attach points. The nose cone of the airplane sustained severe impact damage.

Industrial buildings adjacent to and south of the debris path exhibited impact signatures consistent with that of the accident airplane. Fragmented parts of the airplane were located throughout the area, including on the roofs of the adjacent buildings. A park railroad car exhibited impact signatures, which was evidenced by 2 tire marks on the east end of the car's upper right side.

A defined burn area extended to the northwest and parallel to and south of taxiway Zebra, measuring about 745 feet in length and about 120 feet in width.

TESTS AND RESEARCH

Airframe Examination

On September 22, 2009, a Safety Board air safety investigator, a FAA aviation safety inspector, and a Hawker Beechcraft Corporation air safety investigator conducted a detailed examination of the airframe. The examination revealed that the fuselage was intact and exhibited thermal damage to the right side of the fuselage. Additional thermal damage was observed on the left side of the fuselage over the wing area. The nose gear assembly was separated from the airframe. The avionics bay exhibited impact and thermal damage. The radar dome was separated. The forward cockpit windows exhibited thermal discoloration. A majority of the cabin area windows were melted and thermally damaged. Flight control continuity was established from the cockpit controls to the left and right wing roots, and aft to the area of separation for the rudder and elevators.

An examination of the cockpit revealed that the elevator trim wheel was observed in the "9 degree up" position. According to the Hawker Beechcraft air safety investigator, the normal takeoff range setting for the elevator trim is between 2 and 3 degrees NOSE UP. The aileron

trim wheel was in the neutral position. The rudder trim control knob was observed in the full left position (tab right). The landing gear lever was in the "DOWN" position. The flap lever was in the "UP" position. The HOBBS meter indicated 1,229.6 hours. The left and right power levers were observed about one inch aft of full forward. The left propeller lever was observed in the "FULL FORWARD" / "LOW PITCH" position. The right propeller lever was observed one-half inch forward of the "FEATHER" position. The Hawker Beechcraft investigator stated that the position of the right propeller lever "...would cause the right engine to reach a higher torque because the propeller is now on the primary governor. The result would be a yaw in a left direction." The left condition lever was in the "LOW IDLE" position. The right condition lever was in the "HIGH IDLE" position. The fuel panel was intact. The fuel level quantity switch was in the "MAIN TANKS" position. The left and right fuel standby pumps were in the "OFF" position. The left and right firewall shutoff valves were in the "OPEN" position. No tripped circuit breakers were observed on the fuel circuit breaker panel. The RUDDER BOOST switch was in the OFF position. The propeller auto-feather switch was in the "ARMED" position. The propeller governor switch was in the "OFF" position. The left and right engine auto ignition switches were in the "ARMED" position. All trim wheels rotated freely by hand. The left control yoke buttons moved freely. All seats and shoulder harnesses were intact.

The left wing was fragmented into numerous pieces and exhibited thermal and impact damage. The aileron remained attached via all of its mounts. The aileron trim tab actuator measured 2 inches, which equates to a neutral tab position. When the aileron control cables were pulled, consistent movement of the aileron was observed. Both the inboard and outboard flaps were separated. The inboard and outboard flap actuators were measured and found to be consistent with a fully retracted position. The left main landing gear remained attached to the wing structure. The landing gear was bent aft about 90 degrees. All seven fuel tanks were consumed by the post-impact fire.

The right wing was fragmented into multiple pieces and exhibited thermal damage. The inboard flap remained attached to the wing via all mounts. The outboard flap remained partially attached via the inboard hinge. The aileron was separated and consumed by fire. Remains of the right aileron control cables were observed. The aft control cable remained attached to the bellcrank. The forward control cable was separated from the bellcrank. The forward area of the bellcrank exhibited fire damage.

The left and right elevator trim actuators measured 1.5 inches, which equates to 9 degrees tab down (nose up). The left and right elevators remained attached to the horizontal stabilizers via all mounts. The elevators appeared to be undamaged and moved freely up from stop to stop. The rudder remained attached to the vertical stabilizer via all of its mounts. The rudder moved freely from stop to stop. The rudder trim tab remained attached to the rudder. The aft portion of the rudder trim actuator rod was cut by wreckage recovery personnel. The rudder trim actuator tab rod end was removed from the rudder housing assembly. The actuator rod and housing were matched up to the remaining portion of the actuator on the vertical stabilizer. The rod length was measured to be approximately 1.75 inches, which equates to about 13 degrees tab right. The cockpit rudder trim control wheel was actuated to the left and right, with consistent movement noted at the rudder trim actuator rod. The rudder control knob was placed in the "FULL RIGHT" (tab left) position. The rudder trim control rod measured to be about 2.92 inches, which equates to be 15 degrees tab left.

Engine Examinations

Examination of the left and right Pratt and Whitney PT6A-42 engines was conducted on November 16, 17 and 18, 2009, at the facilities of Pratt and Whitney Canada in St. Hubert, Quebec, Canada, under the supervision of the Transportation Safety Board of Canada. The results of this examination were as follows:

The left engine, serial number PJO478, displayed impact damage, which included impact fractures of the reduction gearbox housing and the compressor inlet case, and compression deformation of the exhaust duct. There was no fire damage.

The right hand engine, serial number PJO475, displayed severe fire damage, including fire consumption of the accessory gearbox housing and compressor inlet, and light compression deformation of the exhaust duct.

Both engine's compressor rotors, compressor impeller shroud, compressor turbine vane ring, compressor turbine, 1st stage power turbine vane ring and shroud, 1st stage power turbine, 2nd stage power turbine vane ring and shroud, and 2nd stage power turbine displayed circumferential rubbing and scoring as a result of having made contact with their adjacent components under impact loads. The left hand engine's propeller shaft was impact fractured. The circumferential rubbing and scoring signatures of the left hand engine were more pronounced than the right hand engine due to the left hand engine sustaining a greater degree of impact deformation.

The engines displayed no indications of any pre-impact anomalies that would have precluded normal engine operation prior to impact.

Propeller Examinations

An examination of the airplane's propellers revealed that both were rotating and not feathered at the time of impact, and that blade damage was consistent with moderate or high power at the time of impact. There were no anomalies noted that would preclude normal operation.

ADDITIONAL INFORMATION

According to the Raytheon Aircraft Company Beechcraft Super King Air B200 & B200C Pilot Checklist, in part the pilot is required to check the following prior to flight:

PROCEDURES BY FLIGHT PHASE

PREFLIGHT INSPECTION, page N-2

Cabin/Cockpit

5. Trim Tabs.....SET TO "o" UNITS

BEFORE ENGINE STARTING, page N-7

20. Pedestal.....CHECK

d. Rudder Boost Switch.....ON

BEFORE TAKEOFF, page N-12

7. Prop Levers.....CONFIRM FULL FORWARD

History of Flight

Initial climb	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Commercial	Age:	37, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last Medical Exam:	10/22/2009
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	02/24/2009
Flight Time:	2913 hours (Total, all aircraft), 1707 hours (Total, this make and model), 2690 hours (Pilot In Command, all aircraft), 32 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Raytheon Aircraft Company	Registration:	N726CB
Model/Series:	B200	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	BB-1750
Landing Gear Type:	Retractable - Tricycle	Seats:	9
Date/Type of Last Inspection:	09/10/2009, Continuous Airworthiness	Certified Max Gross Wt.:	12500 lbs
Time Since Last Inspection:	0 Hours	Engines:	2 Turbo Prop
Airframe Total Time:	1230 Hours	Engine Manufacturer:	Pratt & Whitney
ELT:	Installed, not activated	Engine Model/Series:	PT6A-42
Registered Owner:	Henry Broadcasting Nevada Inc.	Rated Power:	850 hp
Operator:	Henry Broadcasting Nevada Inc.	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	HWD, 52 ft msl	Observation Time:	1154 PDT
Distance from Accident Site:		Direction from Accident Site:	
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	21 °C / 14 °C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	7 knots, 270°	Visibility (RVR):	
Altimeter Setting:	30.08 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hayward, CA (HWD)	Type of Flight Plan Filed:	None
Destination:	San Carlos, CA (SQL)	Type of Clearance:	VFR
Departure Time:	1215 PDT	Type of Airspace:	

Airport Information

Airport:	Hayward Executive (HWD)	Runway Surface Type:	Asphalt
Airport Elevation:	52 ft	Runway Surface Condition:	Dry
Runway Used:	28L	IFR Approach:	None
Runway Length/Width:	5694 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None	Latitude, Longitude:	37.659722, -112.128889

Administrative Information

Investigator In Charge (IIC):	Thomas Little	Adopted Date:	03/16/2011
Additional Participating Persons:	Glenn A Gathright; Federal Aviation Administration; Oakland, CA Thomas McCreary; Hartzell Propeller Inc.; Piqua, OH Tim Rainey; Hawker Beechcraft Corporation; Wichita, KS Thomas Berthe; Pratt & Whitney Canada; South Burlington, VT		
Publish Date:	03/16/2011		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=74745		

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