National Transportation Safety Board
Aviation Accident Final Report

Location:	Madison, Alabama	**Accident Number:**	ERA10FA115
Date & Time:	January 18, 2010, 13:45 Local	**Registration:**	N810JA
Aircraft:	Beech B-60	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The multiengine airplane was at an altitude of 6,000 feet when it experienced a catastrophic right engine failure, approximately 15 minutes after takeoff. The pilot elected to return to his departure airport, which was 30 miles away, instead of diverting to a suitable airport that was located about 10 miles away. The pilot reported that he was not able to maintain altitude and the airplane descended until it struck trees and impacted the ground, approximately 3 miles from the departure airport. The majority of the wreckage was consumed by fire. A 5 1/2 by 6-inch hole was observed in the top right portion of the crankcase. Examination of the right engine revealed that the No. 2 cylinder separated from the crankcase in flight. Two No. 2 cylinder studs were found to have fatigue fractures consistent with insufficient preload on their respective bolts. In addition, a fatigue fracture was observed on a portion of the right side of the crankcase, mostly perpendicular to the threaded bore of the cylinder stud. The rear top 3/8-inch and the front top 1/2-inch cylinder hold-down studs for the No. 2 cylinder exceeded the manufacturer's specified length from the case deck by .085 and .111 inches, respectively. The airplane had been operated for about 50 hours since its most recent annual inspection, which was performed about 8 months prior the accident. The right engine had been operated for about 1,425 hours since it was overhauled, and about 455 hours since the No. 2 cylinder was removed for the replacement of six cylinder studs. It was not clear why the pilot was unable to maintain altitude after the right engine failure; however, the airplane was easily capable of reaching an alternate airport had the pilot elected not to return to his departure airport.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to divert to the nearest suitable airport following a total loss of power in the right engine during cruise flight. Contributing to the accident was the total loss of power in the right engine due to separation of its No. 2 cylinder as a result of fatigue cracks.

Findings

Personnel issues	(general) - Pilot
Aircraft	Recip eng cyl section - Failure
Personnel issues	Repair - Maintenance personnel

Factual Information

HISTORY OF FLIGHT

On January 18, 2010, about 1345 central standard time, a Beechcraft B-60, N810JA, operated by the private pilot, was destroyed after it experienced a right engine failure and impacted terrain in Madison, Alabama. The certificated private pilot and a passenger were fatally injured. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the flight that departed Huntsville International Airport (HSV), Huntsville, Alabama, destined for Nashville International Airport (BNA), Nashville, Tennessee. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

The airplane was owned by the pilot and based in Decatur, Illinois.

According to information obtained from the Federal Aviation Administration (FAA), the flight originated at Boca Raton, Florida, and arrived at HSV about 1230. The airplane was "topped-off" with 185 gallons of 100-low-lead aviation gasoline, and departed at about 1315. The airplane was subsequently cleared to climb to 6,000 feet and proceed direct to BNA. At 1327, the pilot reported that the airplane was level at 6,000 feet; however, about 3 minutes later, the pilot reported that the airplane had experienced a right engine failure. He further stated "...we've got control but ah we we're gonna need to land" and at one point the pilot stated that the right engine was "feathered." The controller informed the pilot that the airplane was about 10 miles west of the Fayetteville Municipal Airport (FYM), Somerville, Tennessee; however, the pilot replied "alright how about ah taking us back to Huntsville that's a big runway." (FYM was equipped with a 5,000-foot-long, asphalt runway) The airplane was then cleared direct to HSV, which was located about 30 miles to the south.

Radar data revealed the airplane made a right turn to reverse course, while gradually descending. At 1333, the airplane was at an altitude of 4,800 feet, about 7 miles west of FYM. At 1337, the pilot reported that he was "trying" to maintain an altitude of 3,000 feet; however, the airplane continued to descend. At 1341, the airplane was issued a low altitude alert and the pilot reported that he was "having a hard time holding altitude." At that time, the airplane was about 10 miles north of HSV, at an altitude of about 1,700 feet. At 1343, the airplane was cleared to land on runway 18R, a 12,600-foot-long, asphalt runway. The airplane's last radar target was recorded at 1345, at an altitude of 800 feet, about 3 miles north of the airport.

Witnesses observed the airplane flying toward the airport at a low altitude, with the right engine not operating. One witness stated that he also observed the right engine "cover or cowling propped up." Another witness observed the airplane impact tree tops and then "nose dive straight in the ground." The airplane was engulfed in flames upon impact.

PERSONNEL INFORMATION

The pilot, age 52, held a private pilot certificate, with ratings for airplane single-engine land, airplane multiengine land, and instrument airplane. Pilot logbooks found at the accident site were compromised due to fire, water and impact damage.

The pilot reported 1,600 hours of total flight experience, which included 52 hours in the past 6 months on his most recent application for an FAA third-class medical certificate, which was issued on November 4, 2009. He reported 1,350 hours of total flight experience, which included 60 hours in the past 6 months, on an FAA third-class medical certificate application dated November 21, 2006.

AIRCRAFT INFORMATION

According to FAA records, the pilot purchased the airplane on March 26, 1998.

The six seat-seat, low-wing, retractable-gear airplane, serial number P-591, was manufactured in 1982. It was powered by two Lycoming TIO-541-E1C4, 380-horsepower engines that were each equipped with a Hartzell constant-speed, full-feathering, three-bladed propeller.

Review of maintenance records revealed that the airplane had undergone an annual inspection on May 20, 2009, at a total airframe time of 3,383 hours. At the time of the accident, the airplane had been operated for about 50 hours since the annual inspection.

The right engine had been operated for about 1,425 hours since it was overhauled on October 10, 1995. On April 11, 2003, at an engine total time of 970.5 hours, the No. 2 cylinder was removed for the replacement of "all 4 small case studs" and the "large forward top...and lower stud."

The left engine had been operated about 270 hours since it was installed on March 1, 2006, after being overhauled.

METEOROLOGICAL INFORMATION

A weather observation taken at HSV (elevation 629 feet), about the time of the accident reported, calm winds; visibility 10 statute miles; few clouds at 25,000 feet, temperature 13 degrees Celsius (C), dew point 7 degrees C; altimeter 30.05 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane struck the tops of about 70-foot tall trees and impacted the ground within a housing development, approximately 3 miles north-northeast of HSV. The initial ground scar was located about 30 feet northeast of the main wreckage. Several freshly cut tree branches, which exhibited 45-degree cuts were observed at the accident site. The airplane came to rest upright, on a heading of about 165-degrees magnetic. All major portions of the airframe were accounted for at the accident site. The majority of the airframe, which included the left wing, cabin, and the airframe structure aft of the rear pressure bulkhead, was consumed by fire. The remaining portions of the airframe and both engines sustained significant fire damage.

The right engine throttle, mixture, and propeller controls in the cockpit were observed in an aft position, and the right fuel selector handle was in the "OFF" position. The left engine throttle, mixture, and propeller controls were observed in a forward position, and the left fuel selector

handle was about 10 degrees left of the "ON" position.

Measurement of the left and right flap actuators corresponded with a 0-degree flap position. The landing gear actuators' position at the landing gear retract gearbox was consistent with the landing gear in the retracted position.

The right engine remained partially attached to the airframe. The right engine propeller assembly was separated and partially buried in the ground, near the initial ground scar. All three propeller blades were in a low pitch position and did not display evidence consistent with rotation. A 5 1/2 by 6 inch hole was observed in the top right portion of the crankcase. In addition, the crankcase was circumferentially cracked through the No.'s 1 and 3 cylinders. The No. 2 cylinder assembly was separated from the engine and located 40 feet beyond the main wreckage. Evidence of chaffing was observed between the No.'s 2 and 4 cylinder cooling fins. The No. 2 connecting rod and connecting rod cap were also separated and located in the debris path. The No. 2 piston and piston pin were not recovered. The engine could not be rotated. All spark plugs were removed and their electrodes were intact. A borescope examination of cylinder No.'s 1, and 3 through 6, did not reveal any anomalies. Both magnetos remained attached. The right magneto was destroyed by fire. The left magneto was removed and sparked on all towers when rotated by hand. Metallic debris was observed in the oil sump; however, the oil filter was absent of visible metallic debris. The right engine was retained for further examination.

The left engine was separated and located 28 feet prior to the main wreckage. The propeller remained attached. All three propeller blades displayed leading edge gouges and chordwise scratches consistent with rotation. Both magnetos remained attached. The right magneto was fire damaged and did not spark when rotated by hand. The left magneto sparked on all towers when rotated. The crankshaft was rotated via the crankshaft flange. Thumb compression was attained and valve train continuity was observed on all cylinders. All spark plugs were removed and their electrodes were intact. Fuel was observed in the fuel inlet. The fuel inlet and oil suction screens were absent of debris. A borescope examination of all cylinders did not reveal any anomalies that would have precluded normal engine operation.

Additional examination of both propellers was conducted by a representative of Hartzell Propeller Inc., under the supervision of an NTSB investigator. All propeller damage was consistent with impact damage and there were no discrepancies that would have precluded normal engine operation.

The left propeller was confirmed to be at a low pitch and rotating at the time of the impact; however, an estimation of power output could not be determined. The right propeller was at a low pitch and did not have evidence of rotation. It could not be determined if the propeller had been feathered prior to impact.

The right engine was examined at Lycoming Engines, Williamsport, Pennsylvania, under the supervision of an NTSB Investigator. During the examination, it was noted that the rear top 3/8-inch and the front top 1/2-inch cylinder hold down studs for the No. 2 cylinder exceeded the manufacturers specified length from the case deck by .085 and .111 inches; respectively. In addition, grease was found on all thru studs, contrary to Lycoming installation procures. The

teardown did not reveal any failures pertaining to cylinder assemblies other than the No. 2 cylinder.

The No. 2 connecting rod, No. 2 cylinder, two through bolts, and portions of the engine crankcase where the No. 2 cylinder would have been mounted were retained and forwarded to the Safety Board's Materials Laboratory, Washington, DC, for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies were performed on the pilot and passenger by the Alabama Department of Forensic Sciences, Huntsville, Alabama, on January 19th and 20th, 2010; respectively.

Toxicological testing was performed on the pilot by the FAA Bioaeronautical Science Research Laboratory, Oklahoma City, Oklahoma, with no anomalies noted.

TESTS AND RESEARCH

According to the NTSB Metallurgist's Factual report, examination of the retained right engine components revealed in part, that the No. 2 cylinder had plastic deformation and tearing of the skirt at the base of the cylinder where it would have mated to the crankcase. The damage was consistent with overstress and did not suggest any preexisting anomalies. One of the through bolts had failed due to a fatigue fracture and the other failed due to an overstress fracture. Additionally, one of the cylinder studs failed due to a fatigue fracture and a fatigue fracture was also observed on the right side of a portion of the crankcase, which remained attached to the cylinder. The fracture was in a plane mostly perpendicular to the threaded bore of the cylinder stud. In addition, the surface of the crankcase surrounding the bore for the through bolt was slightly depressed in the area that would have been covered by the No. 2 cylinder flange. [For additional information please see the NTSB Metallurgical Factual Report located in the public docket.]

ADDITIONAL INFORMATION

Aircraft Performance

The aircraft manufacturer calculated the airplane's climb performance based on an estimated gross weight of 6,400 pounds, with one propeller stopped (not feathered), with the atmospheric conditions present at the time of the accident. The airplane's maximum rate of climb at an altitude of 6,000 feet and at the accident site elevation was determined to be 191, and 341 feet-per-minute; respectively.

History of Flight

Enroute-cruise	Loss of engine power (total) (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Private	**Age:**	52,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:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 None	**Last FAA Medical Exam:**	November 4, 2009
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 1600 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N810JA
Model/Series:	B-60	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	P-591
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 20, 2009 Annual	**Certified Max Gross Wt.:**	6775 lbs
Time Since Last Inspection:	50 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	3383 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Installed	**Engine Model/Series:**	TIO-541 SER
Registered Owner:		**Rated Power:**	380 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	HSV,629 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	160°
Lowest Cloud Condition:	Few / 2500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	0 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	13°C / 7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Huntsville, AL (HSV)	**Type of Flight Plan Filed:**	IFR
Destination:	Nashville, TN (BNA)	**Type of Clearance:**	IFR
Departure Time:	13:15 Local	**Type of Airspace:**	

Airport Information

Airport:	Huntsville HSV	**Runway Surface Type:**	Asphalt
Airport Elevation:	629 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	18R	**IFR Approach:**	None
Runway Length/Width:	12600 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	34.692222,-86.791664

Administrative Information

Investigator In Charge (IIC):	Schiada, Luke
Additional Participating Persons:	David W Hargett; FAA/FSDO; Vestavia Hills, AL Eric Thomas; Hawker Beechcraft Corporation; Wichita, KS John Butler; Lycoming Engines; Arlington, TX Tom McCreary; Hartzell Propeller Inc.; Cape Coral, FL
Original Publish Date:	July 18, 2011
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=75276