Aviation Investigation Final Report

Location:	Niles, Michigan	**Accident Number:**	CHI05FA063
Date & Time:	February 4, 2005, 09:20 Local	**Registration:**	N12AZ
Aircraft:	Beech BE-58	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	4 Fatal
Flight Conducted Under:	Part 91: General aviation		

Analysis

The twin-engine airplane was destroyed when it departed from cruise flight at 7,000 feet mean sea level (msl) in visual meteorological conditions and impacted the terrain in a wooded area. The fight was on an instrument flight rules (IFR) flight plan. The airplane departed at 0838 eastern standard time. Radar track data indicated that altitude remained constant at 7,000 feet msl until 0919:42. At 0919:47, the radar data indicated the airplane was at 6,900 feet msl. At 0919:52, the radar data indicated the airplane was at 5,800 feet msl. At 0919:57, the radar data indicated the airplane was at 5,300 feet msl. At 0920:02, the radar data indicated the airplane was at 3,400 feet msl. No further radar contact with the airplane was recorded. The radar track data indicated that the airplane's heading and altitude went almost "straight down." Radar track data indicated the airplane impacted the terrain at about 300 knots true airspeed with about a maximum descent rate of 25,000-feet per minute. The descent angle of the airplane was about 70-80 degrees nose down. The main wreckage was localized at the impact crater. The engines, the cockpit and cabin, both wings, and the empennage were found in the impact crater. The cockpit was fragmented and destroyed by impact forces. Flight control continuity could not be established due to the destructive impact forces. All flight control cable breaks were consistent with overload fractures. The inspection of the airframe revealed no preexisting anomalies. Engine continuity and compression could not be established for the left and right engines due to impact forces. The engine inspections revealed no preexisting anomalies. The pilot had a total of 11,409 flight hours of which 4,589 hours were in multi-engine aircraft. The airplane seated six including the pilot's seat. The cabin was configured in "club" seating with the middle seats, located behind the pilot's seat, facing aft. The airplane was equipped with a "throw-over" control yoke. The medical examiner reported that the pilot was sitting in the left front pilot's seat, and two passengers were sitting in the second row of seats facing aft, and the other passenger was sitting in the third row of seats facing forward. Due to impact forces, the autopsies and toxicological examinations provided limited medical information.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The steep nose down descent from cruise for undetermined reasons and the subsequent collision with terrain in a steep nose down attitude.

Findings

Occurrence #1: UNDETERMINED
Phase of Operation: CRUISE

Findings
1. (C) REASON FOR OCCURRENCE UNDETERMINED

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

Findings
2. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On February 4, 2005, at 0920 eastern standard time, a Beech BE-58, N12AZ, operated by Beech Leasing LLC, was destroyed when it departed from cruise flight and impacted the terrain in a wooded area 5 miles north of Niles, Michigan. The commercial pilot and three passengers received fatal injuries. The 14 Code of Federal Regulations Part 91 business flight departed County Memorial Airport (SBM), Sheboygan, Wisconsin, at 0738 central standard time and was en route to Lebanon-Warren County Airport (I68), Lebanon, Ohio. Ground fog was present in the area of the accident site, however, the airplane was in visual meteorological conditions at its cruise altitude prior to the time of the accident. The fight was on an instrument flight rules (IFR) flight plan.

The pilot filed an IFR flight plan that indicated a departure time of 0730 central standard time at a cruise altitude of 7,000 feet mean sea level (msl). The filed airspeed was 175 knots with 1 hour 50 minutes en route to I68. He indicated he had 4 hours 45 minutes of fuel on board the airplane.

The flight departed SBM and proceeded on a southeasterly course. The flight was initially in radar and communications contact with Chicago Center, and then was handed off to South Bend Approach Control.

Radar track data indicated that between 0913:25 and 0918:55 (hhmm:ss), the airplane was on a constant heading of about 140 degrees at 7,000 feet msl. At 0918:55, the airplane made a heading change to about 135 degrees after receiving a heading change from South Bend Approach Control. At 0919:42, radar data indicated the airplane was still on a heading of 135 degrees at 7,000 feet msl.

The radar data indicated the average heading between 0919:47 - 0919:57 was about 135 degrees.

At 0919:47, the radar data indicated the airplane was at 6,900 feet msl.

At 0919:52, the radar data indicated the airplane was at 5,800 feet msl.

At 0919:57, the radar data indicated the airplane was at 5,300 feet msl.

At 0920:02, the radar data indicated the airplane was at 3,400 feet msl. No further radar contact with the airplane was recorded. The radar track data indicated the airplane impacted the terrain at about 300 knots true airspeed with about a maximum rate of descent of 25,000-

foot per minute.

Witnesses reported hearing an airplane at a low altitude, but because of the ground fog they did not see the airplane descending or its impact with terrain. A search for the airplane commenced and the wreckage was found in a wooded area.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with single-engine land and sea, multi-engine land, and instrument airplane ratings. He was a certificated flight instructor with single-engine, multi-engine, and instrument-airplane instructor ratings. He held a second class medical certificate. His medical examination was conducted on March 12, 2004. He had a total of 11,409 flight hours. 6,820 flight hours were in single-engine aircraft and 4,589 hours were in multi-engine aircraft. He had flown 55 hours in the last 90 days, 33 hours in the last 30 days, and 2.7 hours in the last 24 hours. He had flown the accident airplane 24 hours in the last 90 days, 16 hours in the last 30 days, and 2.7 hours in the last 24 hours. He worked as a flight instructor at a fixed base operator in Sheboygan, Wisconsin. Beech Leasing LLC occasionally hired the pilot to fly N12AZ on business flights.

One of the passengers held a private pilot's certificate with single-engine, multi-engine, and airplane instrument ratings. He held a current Third Class medical certificate. His last medical examination was conducted on August 16, 2004. He reported his total flight time was 1,900 hours during his last medical examination. He had purchased N12AZ in November 2000. He sold the airplane to Beech Leasing LLC, which he was the controlling member, in November of 2004.

He and his brother, who was a passenger on board the airplane, were co-owners of a manufacturing plant located in Plymouth, Wisconsin. The third passenger was a vice-president of the firm. They were flying to Ohio on a business trip.

AIRCRAFT INFORMATION

The airplane was a 1970 twin-engine Beech BE-58 Baron, serial number TH-53. It had a maximum gross weight of 5,400 pounds that seated six. The cabin was configured in "club" seating with the middle seats, located behind the pilots' seats, facing aft. The airplane was equipped with a "throw-over" yoke and dual rudder pedals.

The airplane had a total time of 3,766 hours. The last annual maintenance inspection was conducted on November 4, 2004. It had flown 36 hours since the last annual inspection.

The engines were 285 horsepower Continental IO-520-C engines. The left engine had a total of 1,032 hours and had been installed on N12AZ on June 6, 1996. The right engine had a total of 37 hours and had been installed on N12AZ on October 19, 2004.

METEOROLOGICAL INFORMATION

At 0919, the surface weather observation at the South Bend Regional Airport (SBN), South Bend, Indiana, located about 13nm south of the accident site, was: Wind calm, 1/4 statute mile visibility, freezing fog, vertical visibility 200 feet, temperature -6 C, dew point -7 C, altimeter 30.36 inches of mercury, surface visibility 1/2 statute miles.

At 0920, the surface weather observation at the Southwest Michigan Regional Airport (BEH), Benton Harbor, Michigan, located about 20nm northwest of the accident site, was: Wind 140 degrees at 3 knots, 2 statute miles visibility, mist, clear, temperature -3 C, dew point -4 C, altimeter 30.34 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted the terrain in a grove of trees in a small valley with about a 10-degree upslope. The coordinates of the wreckage site were 41 degrees 56.312 minutes north latitude, 086 degrees 13.428 minutes west longitude.

The airplane impacted a 75-100 foot tall oak tree that was over 3 feet in diameter at its base. The collision of the airplane and the tree separated four large tree limbs from the tree trunk and three major impact scars were exhibited in the upper branches of the tree. One of the downed branches exhibited a 45-degree cut with a gray paint transfer on it. The airplane impacted the rising slope about 30 feet southeast of the base of the tree on a heading of about 140 degrees magnetic. The descent angle of the airplane from the top of the tree to the impact crater was about 70-80 degrees nose down. The main wreckage was localized at the impact crater. The engines, the inboard sections of both wings, the cockpit and cabin, and the empennage were found in the impact crater. Dirt and aircraft debris were found for a distance of about 75 feet in a fan shaped pattern, primarily from the northeast to the southeast of the main wreckage. The right engine was found on the left side of the wreckage about 5-7 feet beneath the surface. The right propeller was broken from the engine flange. The left engine was found on the right side of the wreckage about 5-7 feet under the surface. The propeller remained attached to the engine except for one blade that was broken out of the propeller blade hub. The wings were oriented on about a 155/335 degree magnetic heading. The nose of the airplane was oriented on about a 065 degree heading. No evidence of a fire was found at the accident site.

The nose of the airplane was found fragmented within the impact crater. The fiberglass nose cone from the airplane was found shattered and resting on the snow around the accident site. Portions of the windshield frame were found at the accident site. There was no soot found on the inside of the plexiglass. The nose landing gear was found within the impact crater. The tire was torn and the nose wheel was fractured.

The cockpit was fragmented and destroyed by impact forces. The majority of the instrument panel, its gauges, indicators, and instruments were not found. Radios from the instrument

panel were observed but did not have identifiable faceplates. A small section of the right side of the instrument panel that measured 7.5 inches by 11 inches was the only recognizable part of the instrument panel found. The instruments were fractured and no legible readings were recovered. A rotor from one of the attitude gyros or heading indicators was found separated from the rest of the instrument. The rotor exhibited gouging and rotational smearing.

All six pilot/passenger seats were recovered from the impact crater. The seat backs were found separated from the seat bottoms. The seat cushions were found ripped and torn, and they were separated from their respective seat tracks. The fifth and sixth seats were separated from their respective positions at the back of the passenger cabin.

Both of the pilot seat belts and shoulder harnesses were found within the cockpit. The left front seat belt and shoulder harness were fastened together and found with the pilot's body. The shoulder straps and fittings from the right front seat belt were found without the seat belt buckle fittings attached.

Three of the four seat belt sections were found attached to the aft row seat location floorboard. Both of the male bayonet sides of the belt buckles were intact. The only female side of the belt assembly was torn and separated 23 inches from the belt fitting anchor.

The front and rear wing spar carry-throughs were found in the impact crater and crushed together. The left wing was separated from the left side of the fuselage at the wing attach bolt bathtub fittings and found fragmented into numerous pieces. The four left wing attach bolts were found within the wreckage debris. The left wing rear spar was bent and wrinkled, but the left wing flap was found still attached to the flap track brackets. The left aileron was fragmented and crushed, but was found attached to aileron hinge brackets along the outboard left wing rear spar. The aileron flight control cable bell crank was fractured. The left aileron trim tab was separated from the trim tab actuator. The aileron trim tab actuator measured one and 9/16 inches, which equates to a position of 2 degrees tab down. The left landing gear shock strut was found within the accident impact crater. The wing flap actuator was destroyed by the accident, and did not provide a flap setting measurement. The left wing tip with its navigation light and strobe light receptacles was found at the impact site. A 20-inch section of the left wing leading edge skin was found attached to the left wing tip.

The right wing was separated from the fuselage at the wing attach bolt bathtub fittings and fragmented into numerous pieces. The right front wing spar was found completely separated from the rear wing spar. The wing was separated into so many pieces that there was no wing box section where the two spars were connected. The leading edge, upper wing skins, and lower wing skins exhibited tearing, and wrinkling from front to rear. The pieces of wing skin numbered in excess of 35 different pieces that were varying sizes. Some pieces measured a few square inches to portions that were three feet in length, and 15 inches wide. The inboard end of the right wing was found in the impact crater. It was separated from the right side of the fuselage at the wing to fuselage mount bolts. The right wing and wing flap were identified by the anti-skid wing walk paint on the upper surface of the right wing. The right wing flap was

separated from the flap tracks and from the rear spar. The outboard 14 inches of wing flap was found separated from the inboard flap section, and found within the impact crater. The right main landing gear shock strut, wheel, and tire assembly, were found within the impact crater site. The aileron flight control cables were separated from the wing. Pieces of the aileron flight control bell crank were fractured. The right wing flap actuator was destroyed and did not provide a wing flap setting measurement. The right wing tip with its navigation light receptacle and four feet of leading edge skin were found at the accident site.

The empennage, although crushed and fragmented, was found at the impact crater. Both vertical and horizontal stabilizers were found attached to the empennage. The lower half of the vertical stabilizer, and inboard end of the horizontal stabilizers were found attached to empennage at the aft end of the fuselage. The empennage exhibited a "scorpioned" (bent over) shape. The leading edge of the vertical stabilizer and inboard leading edge of the horizontal stabilizers were crushed aft.

The tip of the vertical stabilizer and top of the rudder were found in the impact crater. The bottom 24 inches of the rudder was found attached to the vertical stabilizer at the rudder hinge point. The upper 20 inches of the vertical stabilizer was separated from the lower end of the vertical stabilizer. The top 24 inches of the rudder with its counterweight was found separated from the lower end of the rudder and separated from the vertical stabilizer. The rudder trim tab actuator rod measured 3 and 9/16 inches, which equates to 10 degrees tab right. The rudder trim tab control rod was found separated at the trim tab where the trim tab control horn fractured at the surface of the rudder trim tab.

The left horizontal stabilizer exhibited aft bending of the horizontal stabilizer spar. The inboard 34 inches of the left horizontal stabilizer was found attached to the empennage. The aft spar on the left horizontal stabilizer was straight for about 20 inches from the fuselage and terminated in a separation of the outboard aft spar. The inboard one-half of the left elevators and trim tab was found attached to the left horizontal stabilizer rear spar. The left elevator trim tab push rod was found bent 30 degrees, and separated at the push rod to trim actuator rod end. The left elevator tip and counterweight frame were found. The left elevator counterweight piece was found separated from its shell.

The right horizontal stabilizer exhibited aft bending of the horizontal stabilizer spar. The inboard 46 inches of the right horizontal stabilizer was found attached to the empennage. The right horizontal stabilizer aft spar was found attached to the empennage but curved aft 60 degrees at the area of the elevator trim tab actuator mount flange. The inboard one-half of the right elevator and the elevator trim tab was found attached to the right horizontal stabilizer rear spar. The right elevator trim tab push rod was bent 40 degrees but remained attached at both ends. One end was found attached to the elevator trim tab actuator and the other end to the trim tab control horn. The right elevator trim tab actuator measured 5/8 inch, which equates to a setting beyond the normal range of up trim. The tip of the right elevator was not found, but the leading edge of the right horizontal stabilizer tip exhibited an impact radius about 4 inches in diameter.

The aft fuselage, along with the empennage, was found within the accident impact crater on top of the fuselage. An eight foot section of bottom fuselage skin was found attached to the empennage. It was crushed and wrinkled aft. The tail cone was found attached to the aft fuselage bulkhead.

Flight control continuity could not be established due to the destructive impact forces. All flight control cable breaks had fractures that were consistent with overload.

The inspection of the left engine revealed that the crankcase forward of the number 5 main journal was broken and missing. Ten percent of the sump was missing and the first 1/3 of the 2,4,6 side of the sump was peeled back in the aft direction. The rest of the sump was crushed flat into the camshaft. All six of the lower sparkplugs were broken at mid point of the plugs. All six cylinders valve covers had impact damage and were missing approximately 50 percent of their covers. The number 4 and 6 cylinders were loose and broken free from the crankcase. The number 2 cylinder exhibited impact damage and the upper fins were crushed and broken. The number 6 cylinder was missing one of its push-rod tubes. The number 1,2,3,4,5 cylinders push-rod tubes were damaged. The top of the number 1,3,5 cylinders exhibited impact damage and the upper fins were crushed and broken. The entire accessory case was broken and missing. The oil cooler exhibited impact signatures. The alternator was impact damaged. The oil pump housing was fractured and attached to a portion of the accessory case housing. The internal oil pump housing was smooth with no signatures of scoring. The starter was broken off of the accessory case and exhibited impact damage. A core piece of magneto was found shattered and broken with the impulse coupling attached. The oil filler cap was broken.

The inspection of the right engine revealed that there was a two and 7/8 inch punched hole from above the number 1 and 3 cylinders. The number 5 and 6 cylinders had significant impact damage with 40 percent of the heads missing. The number 5 cylinder pulled away from the crankcase in an aft orientation striking the number 3 cylinder fins and head. The number 6 cylinder pulled away from the crankcase in an aft orientation striking the number 4 cylinder fins and head. The number 3 and 4 cylinders were bent in an aft orientation striking the number 1 and 2 cylinder heads. The number 3 and 4 cylinder valve covers are broken off from impact damage and were missing. The number 1 and 2 cylinder valve covers were intact. The number 1 and 2 cylinders exhibited impact damage on the aft side crushing the cylinder head fins. The number 1,2,3,4,6 fuel injector nozzles were damaged from impact. The number 1,2,4,6 top spark plugs appeared undamaged. The number 3 top spark plug was broken in the middle. The number 5 top spark plug was missing the top half and the center electrode portion of the lower half. The oil filter adapter exhibited impact damage and was broken from the crankcase. The accessory housing was broken and about 90 percent of it was missing. The oil pump and housing were missing. The vacuum pump was damaged and broken off at the mounting flange. The vacuum pump coupler was undamaged. Only two of the intake tubes were recovered. The fuel pump and coupler exhibited impact damage. The oil cooler exhibited impact damage. The starter adapter gears were found outside of their housing and the main gear exhibited impact damage. The fuel manifold was found and all the fittings were found

sheared off. A small portion of the alternator case was recovered. The engine sump and oil pick-up tube were missing from the bottom portion of the engine case. The number 1,2,3,4,5 push rod tubes were intact and damaged. The number 6 push rod tubes were missing. The crankshaft main gear was intact and 25 percent of it was bent from impact. The aft camshaft gear was missing and the forward gear was broken from impact.

The left propeller remained attached to the crankshaft flange. The propeller blade marked "A" was found in the propeller hub. It was bent and exhibited S bending with leading edge damage and chordwise gouges and scratching. The propeller blade marked "B" was found in the propeller hub. It was "wrinkled" with S bends with blade twist. The tip was broken off, and the tip was not located. The propeller blade marked "C" was found broken out of the propeller hub. It was bent over in a 90-degree angle and it exhibited blade twist. Nine inches of the blade tip was broken off, but the tip was located in a field next to the impact site.

The right propeller was broken off at the crankcase just forward of the number five main journal. All three propeller blades were attached to the propeller dome and hub. The propeller blade marked "A" was found loose in the hub. It exhibited S bending and chordwise gouging on its back face. The blade was bent back 20 degrees and had chunks of the trailing edge missing from much of the outboard half of the blade. Six inches of the blade tip was broken off. The propeller blade marked "B" was found loose in the hub. It exhibited S bending and blade twist. It exhibited chordwise scratching, and it had a leading edge nick at midpoint. The propeller blade marked "C" was bent forward, and then at midpoint it was bent aft over 180 degrees. It exhibited blade twist and there was a gouge on leading edge tip.

The left engine fuel pump and a portion of the fuel pump drive adapter were sent to the National Transportation Safety Board's Materials Laboratory for examination.

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies of the pilot and passengers were performed at the Lakeland Hospital, St. Joseph, Michigan, on February 6, 2005.

The medical examiner removed the bodies from the airplane wreckage at the impact site. In the autopsy reports the medical examiner reported that the pilot was sitting in the left front pilot's seat, and two passengers were sitting in the second row of seats facing aft, and the remaining passenger was sitting in the third row of seats facing forward.

A Forensic Toxicological Fatal Accident Report was prepared by the FAA Civil Aeromedical Institute. The pilot report indicated 16 (mg/dL), mg/hg) Isopropanol was detected in the muscle. The test was negative for all other substances tested.

Isopropanol is isopropyl alcohol (rubbing alcohol). It is commonly used in de-icing fluid and various cleaning solutions, and as an icing inhibitor added to aircraft fuel tanks.

TESTS AND RESEARCH

The NTSB's Materials Laboratory examined the left engine fuel pump and a portion of the fuel pump drive adapter. The report indicated that the pump exhibited fracture features consistent with an overload event, and the fuel pump drive adapter exhibited fracture features consistent with a bending and torsion event.

ADDITIONAL INFORMATON

The FAA, Raytheon Aircraft Company, and Teledyne Continental Motors were parties to the investigation.

The aircraft wreckage was released to AIG aviation insurance company.

Information

Certificate:	Commercial; Flight instructor	**Age:**	71,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:		**Last FAA Medical Exam:**	March 1, 2004
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 1, 2005
Flight Time:	11406 hours (Total, all aircraft), 11390 hours (Pilot In Command, all aircraft), 55 hours (Last 90 days, all aircraft), 33 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N12AZ
Model/Series:	BE-58	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	TH-53
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	November 1, 2004 Annual	**Certified Max Gross Wt.:**	5400 lbs
Time Since Last Inspection:	36 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	3766 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	IO-520-C
Registered Owner:	Beech Leasing LLC	**Rated Power:**	285 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	BEH,643 ft msl	**Distance from Accident Site:**	20 Nautical Miles
Observation Time:	09:20 Local	**Direction from Accident Site:**	135°
Lowest Cloud Condition:	Clear	**Visibility**	2 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	140°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.34 inches Hg	**Temperature/Dew Point:**	-3°C / -4°C
Precipitation and Obscuration:			
Departure Point:	Sheboygan, WI (SBM)	**Type of Flight Plan Filed:**	IFR
Destination:	Lebanon, OH (I68)	**Type of Clearance:**	IFR
Departure Time:	07:38 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	3 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Fatal	**Latitude, Longitude:**	41.93861,-86.223892

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	Dave Kepple; FAA - South Bend FSDO; South Bend, IN Eddie Webber; Raytheon Aircraft Company; Wichita, KS Jason Lukasik; Teledyne Continental Motors; Mobile, AL Tom McCreary; Hartzell Propeller Company; Piqua, OH
Original Publish Date:	June 28, 2006
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=60978