Aviation Investigation Final Report

Location:	ELKHART, Indiana	**Accident Number:**	CHI99FA075
Date & Time:	January 22, 1999, 18:40 Local	**Registration:**	N40HC
Aircraft:	Beech BE-55	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation		

Analysis

The airplane was cleared for the ILS Rwy 27 approach. Radar data indicated the airplane had intercepted the inbound approach course of 271 degrees. The surviving passenger reported he heard the landing gear extension and saw the three landing gear indicator lights illuminate. He reported that he did not hear the airplane malfunction or hear any abnormal sounds. He reported he saw the glow of parking lot lights in the fog out the left rear window. He reported seeing the pilot looking out the left window and then looking to the front of the airplane. The airplane initially impacted two 40 foot pine trees about 800 feet from the wreckage site. The radar data hit was recorded when the airplane was about 1,300 feet msl and about 2.0 nm from the runway. It indicated the airplane's glide path was about 130 feet below the ILS Rwy 27's glide path. The reported weather was winds 120 at 7 knots, visibility 1/2 mile, light rain, mist, indefinite ceiling, 200 foot overcast, 9 degrees C, 29.77. A weather station 14 miles from the accident was reporting the temperature and dew point as 8 degrees C. Ground fog was reported in the area. The airplane did not exhibit any pre-impact anomalies.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot failed to maintain a proper glidepath and obstacle clearance. Factors were the fog and dark night.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: APPROACH

Findings
1. (F) WEATHER CONDITION - FOG
2. (F) LIGHT CONDITION - DARK NIGHT
3. (C) PROPER GLIDEPATH - NOT MAINTAINED - PILOT IN COMMAND
4. (C) ALTITUDE/CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND

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

Factual Information

History of Flight

On January 22, 1999, at 1840 eastern standard time (All times EST), a Beech BE-55, N40HC, was destroyed when it impacted the terrain during an instrument approach. The 14 CFR Part 91 business flight had departed Worthington Municipal Airport (OTG), Worthington, Minnesota, at approximately 1540 en route to Elkhart Municipal Airport (EKM), Elkhart, Indiana. The airplane was executing the ILS 27 approach when it hit trees and impacted the ground about 190 feet from the middle marker. The pilot and one passenger received fatal injuries, and one passenger was seriously injured. Instrument meteorological conditions prevailed and an instrument flight plan had been filed.

Federal Aviation Administration (FAA) transcripts indicate the pilot contacted the Princeton, Minnesota, Automated Flight Service Station (AFSS) at 1504 by telephone to file an IFR flight plan for a flight from Worthington, Minnesota, to Elkhart, Indiana. The pilot also received a standard weather brief. At 1532, the pilot phoned the Princeton AFSS and received an IFR flight clearance. The flight was cleared to 7,000 feet altitude and it had a Void Time of 1548.

At 1547, the Air Traffic Controller who controlled Sector 33 at the Minneapolis ARTCC, called "in the blind" for N40HC. The pilot of N40HC contacted Sector 33 and reported the airplane had departed Worthington and was climbing through 3,500 feet mean sea level (msl). At 1549, the airplane continued its climb to its en route altitude of 7,000 feet msl.

At 1629, N40HC contacted Waterloo Approach Control and reported that the flight was at 7,000 feet msl. At 1636, the Waterloo Approach Control reported, "...I am receiving your transponder. Altitude indicates seven thousand."

The en route portion of the flight continued to Indiana. At 1817, N40HC was told to contact South Bend Approach Control (SBN).

At 1818:05, SBN reported, "Baron Four Zero Hotel Charlie, South Bend Approach. The weather at Elkhart is wind one two zero at seven, visibility one half, light rain, mist. Indefinite ceiling, two hundred overcast. Temperature niner. The altimeter two niner seven seven. And you can let me know what approach you would like please."

The radar data indicated that at 1818:08, N40HC's altitude was 7,000 feet mean sea level (msl).

At 1818:25, N40HC responded, "Ah, guess we have to try the ILS 27."

At 1818:29, SBN started issuing N40HC radar vectors for the ILS Rwy 27 approach into Elkhart, Indiana.

The radar track indicated that N40HC's flight path took N40HC approximately eight miles south of the Elkhart Municipal Airport as it continued heading east. N40HC continued heading east until SBN vectored it back to the north in order to intercept the ILS Rwy 27 inbound localizer course of 271 degrees.

At 1833:55, SBN transmitted, "Baron Four Zero Hotel Charlie, turn left to heading three six zero. Descend and maintain two thousand five hundred."

At 1834:00, N40HC responded, "Three six zero, twenty five hundred, Forty Hotel Charlie."

The radar data indicated that N40HC turned to the north and started descending in altitude.

At 1834:48, SBN transmitted, "Baron Zero Hotel Charlie, six miles from Sousa. Turn left heading three zero zero maintain two thousand five hundred til established on the localizer. Cleared ILS 27 approach to Elkhart."

At 1834:57, N40HC responded, "Three zero zero, twenty five hundred. Cleared for the approach, Four Zero Hotel Charlie."

The radar data indicated that at 1835:13, N40HC's altitude was 3,300 feet msl.

The radar data indicated that N40HC intercepted and turned inbound on the ILS Rwy 27 inbound course heading of 271 degrees.

At 1837:01, SBN transmitted, "Baron Four Zero Hotel Charlie, contact Elkhart Tower now on one one niner point five." The radar data indicated that at 1837:14, N40HC's altitude was 2,500 feet msl, and the ground speed was approximately 120 knots.

The transcript from the Elkhart Tower indicated that the Tower Controller transmitted the following instructions to N40HC at (1836:13) (The times indicated on Elkhart Tower's tape recording were not synchronized with SBN's tape or the radar data's time indications): "Hotel Charlie, report the marker. Wind is, ah, one two zero at seven. Altimeter two niner seven five."

At (1836:26), N40HC responded, "I got everything, (Unintelligible)."

At (1836:30), the Tower transmitted, "Cleared to land two seven."

At (1839:08), the Tower transmitted, "Hotel Charlie, Tower."

At (1839:16), the Tower transmitted, "Four Zero Hotel Charlie, Tower."

The transcripts from SBN and the Elkhart Tower indicate that both facilities tried to make radio contact with N40HC but without success. SBN contacted two aircraft that were flying in the Elkhart area to check if they were picking up any signals from an Emergency Locator Transmitter (ELT). Both aircraft indicated that they were receiving an ELT transmission.

The radar data indicated that at 1837:55, N40HC's altitude was 2,200 feet msl and was about 0.2 nautical miles east of Sousa, the ILS Rwy 27 Outer Marker.

The radar data indicated that there were eight radar "hits" between Sousa and the last radar hit recorded before radar contact with N40HC was lost due to altitude and terrain. The radar hits were recorded approximately every 10 seconds.

The last six radar hits indicate that N40HC's glide path was approximately 100 feet below the ILS Runway 27 glide path.

N40HC was approximately 2.0 nautical miles from the approach end of runway 27 when the last radar hit was recorded at 1839:16. The altitude indicated was 1,300 feet msl, which was approximately 130 feet below the ILS Runway 27 glide path.

A ground search for N40HC was initiated. At 2028, the airplane wreckage was located approximately 0.4 nautical miles east of the approach end, and near the centerline, of runway 27 at the Elkhart Municipal Airport. One passenger was found conscious and alert. The other passenger and pilot were found unconscious, and later pronounced deceased by Elkhart Fire Department paramedics. The ground search was hampered by fog and the dark night.

Personnel Information

The pilot was an airline transport rated pilot with single engine land and sea ratings and a multi-engine land rating. He was a Certified Flight Instructor with single engine land and multi-engine land and instrument instructor ratings. He held a Second Class medical certificate.

The pilot had a total of about 7,400 hours of flight time. A computerized pilot's log that dated back to September 1, 1987, was obtained. The pilot logbooks that pre-dated the computerized logs were not obtained. The computerized log indicated that the pilot had flown 2,687 hours between September 1, 1987, and December 19, 1998. The log indicated the pilot first flew N40HC on August 16, 1997, and had a total of approximately 135 flight hours in N40HC. In the last 90 days, the pilot had flown approximately 102 hours with about 20 hours in N40HC.

The pilot owned and operated a similar make and model airplane. The pilot operated his airplane from the Elkhart Municipal Airport.

A business associate of the pilot reported that she had flown with the pilot on numerous occasions. She reported that the pilot did not fly approaches with the autopilot engaged.

Aircraft Information

The airplane was a twin engine Beech BE-55 Baron, serial number TC-1974. The airplane seated five and had a maximum gross weight of 5,121 pounds. The engines were 260 horsepower Continental IO-470-L engines. The last annual inspection was conducted on November 4, 1998. The airplane had flown 141 hours since the last inspection and had a total time of 3,678 hours.

Meteorological Conditions

At 1818:05, the SBN Approach Control reported the weather at Elkhart, Indiana, was: winds 120 degrees at seven knots, visibility one half mile with light rain and mist. Indefinite ceiling two hundred overcast. Temperature 9 degrees Celsius. Altimeter 29.75.

Elkhart Tower did not have the capability to report the Dew Point temperature.

At 1836:13, the Elkhart Tower reported the winds were 120 at 7 knots and the altimeter was 29.75.

At 1845, the Elkhart weather observation reported winds at 120 at seven knots, visibility one half mile, light rain and fog, indefinite ceiling two hundred feet, temperature nine degrees Celsius, altimeter 29.77.

At 1834, the South Bend, Indiana, weather observation, located approximately 14 nautical miles from Elkhart, Indiana, reported winds at 080 degrees at 5 knots, visibility measured 1/4 mile, light rain, fog, overcast 400 feet, temperature 8 degrees Celcius, dew point temperature 8 degrees Celsius, Altimeter 29.73, tower visibility 1/4 mile.

At 1854, the South Bend, Indiana, weather observation reported winds at 000 at 0 knots, visibility measured 1/4 mile, light rain, fog, indefinite ceiling 100 feet, temperature 6 degrees Celcius, dew point temperature 6 degrees Celsius, Altimeter 29.75, tower visibility 1/4 mile.

Wreckage and Impact Information

The airplane wreckage was located in a creek bed about 0.4 nautical miles from the approach end of runway 27 at the Elkhart Municipal Airport. The coordinates were North 42 degrees 43.235 minutes and West 085 degrees 59.117 minutes. The southeast corner of the runway 27 ILS Middle Marker was located approximately 190 feet from the wreckage on a bearing of 300 degrees.

GPS coordinates were taken of five locations along N40HC's approach and wreckage path. GPS coordinates were taken of the two southernmost corners of the Walmart retail store, the first two of three trees that were hit by N40HC, and the impact site.

The Walmart retail store is located approximately 0.8 statue miles from the approach end of runway 27 and was still under construction in January 1999. The store's roof has rows of skylights. On the night of the accident, the skylights were illuminated by the store's interior lights.

The distance from the southwest corner of the Walmart to the first tree impacted was approximately 820 feet, and approximately 1620 feet from the main wreckage site.

The wreckage path indicated that the airplane first struck the tops of two pines trees that were about 40 feet in height and about 800 feet from the main wreckage. A second tree located about 410 feet from the main wreckage was hit near the tops of its branches. A branch about four inches in diameter that exhibited a propeller strike was found near the second tree. A third tree that was hit was located approximately 40 feet from the main wreckage and was just east of the creek.

The wreckage path was on a heading of approximately 262 degrees. The initial ground impact scar and crater were located 17 feet from the west edge of the creek. The ground impact scar was approximately 7 feet by 3 feet and was filled with water and blue colored aviation gas. The aircraft was on its right side and the bottom of the airplane was resting against a tree. The horizontal and vertical stabilizer remained attached to the fuselage. The outboard half of the right wing was broken and crushed and found to the right of the empennage. The right engine and cowling had separated from the wing and were found to the right of the fuselage. The outboard half of the left wing was located to the right of the airplane's cabin. The left landing gear was found in a down and locked position and still attached to the left inboard wing. The left engine had separated from the left wing and was located in front of the main wreckage. The propeller had separated from the left engine.

Flight control continuity was checked. The elevator and rudder cables exhibited continuity from the cockpit to the flight control surfaces. The aileron cables were failed in overload.

The left engine was inspected and no pre-impact anomalies were noted. The crankshaft was rotated and continuity was confirmed to all of the cylinders and to the accessories. A differential compression check was performed with the following results: 1. 64/80 2. 44/80 3. 59/80 4. 40/80 5. 54/80 6. 60/80. The left magneto sparked at all six terminals when rotated. The right magneto's shaft was slightly bent and could not be rotated. The left fuel pump was not damaged and was free to rotate. The drive coupling was intact.

The right engine was inspected and no pre-impact anomalies were noted. The crankshaft was rotated and continuity was confirmed to all of the cylinders and to the accessories. A differential compression check was performed with the following results: 1. 60/80 2. 40/80 3. 63/80 4. 60/80 5. 65/80 6. 54/80. The left and right magnetos sparked at all six terminals when rotated. The right fuel pump was not damaged and was free to rotate. The drive coupling was intact.

The left propeller was broken off the engine flange. The engine flange exhibited a 45 degree sheer lip. Leading edge rubbing was evident on the blades. One blade had "S" type bending. Another blade exhibited blade twist and tip curl. The left propeller dome exhibited an impression of the counterweight that corresponded to the propeller being near low pitch during impact.

The right propeller remained attached to the right engine. Leading edge rubbing was evident on the blades. One blade was bent aft with multiple bends. The right propeller dome exhibited an impression of the counterweight that corresponded to the propeller being near low pitch during impact.

The fuel on board at the time of the accident was estimated to be 76 gallons. The fuel tanks ruptured. There was no fire or explosion.

The cables from the power quadrant to the engines were severed.

Medical and Pathological Information

The autopsy of the pilot was performed at the Elkhart General Hospital, Elkhart, Indiana.

A Forensic Toxicology Fatal Accident Report was prepared by the FAA Civil Aeromedical Institute. The report was negative.

Tests and Research

On January 23, 1999, the FAA conducted a flight inspection of the Elkhart ILS RWY 27 (amdt1) approach. The results of the flight test indicated: "Facility operation found satisfactory."

The pilot's side altimeter and Horizontal Situation Indicator (HSI) were examined on January 27, 1999, at Joliet Aviation with NTSB oversight. The inspection revealed that the altimeter read 760 feet when the test equipment was selected to 777 feet. The altimeter tested 20 feet low at test altitudes of 500, 1000, 1500, and 2000 feet.

The Horizontal Situation Indicator inspection revealed the localizer needle and the glide slope needle operated. The inspection revealed the off flag operated.

The Glide Slope (GS) receiver was examined at the S-TEC Corporation with FAA oversight on April 29, 1999. The inspection revealed the connector was damaged with the front pin guide broken and most of the pins bent and pushed out of the guide. A piece of wood was found jammed in the connector guide. An internal inspection of the unit revealed a metal shield had been impacted and was pressed down on a circuit board. When power was applied, the GS Flag was in view and the GS deviation indicator was inoperative. The GS flag circuit checked normal. The GS deviation indicator circuits were checked normal, although the GS center was 20 MV high which would place the aircraft a few feet higher than normal on the glide slope at

the Middle Marker. (See the S-Tec examination report)

Additional Information

The passenger reported the original destination for the flight was Milwaukee, Wisconsin, but because Milwaukee was fogged in, the decision was made to return to Elkhart, Indiana. The passenger reported that he was seated in the right rear seat and the other passenger was in the left rear seat. He reported that there was no conversation with the pilot during the flight. He reported the pilot was wearing a headset and the two passengers were not.

The passenger reported the flight encountered "stormy conditions." He reported that as the airplane was approaching Elkhart from the east, he noticed the "very bad fog conditions." He reported that he and the passenger were nervous because of the weather conditions.

The passenger reported that he heard the airplane's landing gear being lowered and saw the three landing gear indicator lights illuminate. (He estimated that the landing gear was lowered approximately two to five minutes before the accident.) He reported that he and the other passenger were trying to determine their position over the ground. He reported that they looked out to the left of the airplane and saw lights on the ground. He reported he could see the glow of the parking lot lights of the Walmart. The passenger reported that he saw the pilot looking about 90 degrees out the left side of the window and then turning his head back to the front.

The passenger reported that he turned in his seat and put his head down and his hands in his lap. The passenger reported that he closed his eyes before the airplane impacted the trees and ground. He reported the next thing he knew was he was conscious and the airplane was open. He reported that he went in and out of consciousness until he was rescued by emergency personnel.

The passenger reported that the airplane did not malfunction and he did not hear anything abnormal during the approach. He reported the airplane's wings were level and the landing gear were down when he saw the glow of the Walmart parking lot lights.

Personnel employed at Indiana Flight Service, a Fixed Base Operator (FBO) located at the Elkhart Municipal Airport, reported they had heard the radio transmissions between the Tower and N40HC. The customer service representative reported she heard N40HC acknowledge the landing clearance for runway 27. Two line service technicians reported they went out to a hangar to open the doors for N40HC's arrival, but when it did not land after 10 minutes, they thought the airplane had diverted to another airport. Both of the line service technicians reported seeing a twin engine airplane flying over the airport to the south or southeast while they waited for N40HC to land.

A witness who was driving by the airport going north on Michigan Street, a street located along the eastern boundary of the airport, reported that at 1831 on January 22, 1999, "...the weather

was extremely foggy in low lying areas." He reported that at 1835, "...we were passing the airport and I remarked to my fiancee that the airport must be closed, as the approach strobes weren't on. Visibility was about 300 ft to 1000 ft... ."

A witness who is employed as a B-737 Captain for Delta Airlines reported that at 1835 on January 22, 1999, he was at a store parking lot located 1.1 miles east of the approach end of runway 27. He reported he, "...heard the airplane on final approach. I thought it was surprising that an aircraft would be making an approach in such low visibility which I estimated to be between 1/2 to 1/4 mile. I probably listened for 15 seconds or so before getting into my car and then heard no more. I never saw the lights of the aircraft either because of the low ceiling and/or poor visibility. The engine noise sounded steady. It also seems it was a normal RPM and loudness level for an aircraft on short final approach."

The tower transcripts indicate that a twin engine Piper Aztec had landed at the airport at approximately 1813. The customer service representative from the FBO reported that she could see the airport beacon when the Aztec landed. She reported, "The fog got bad real fast." She reported that by the time N40HC was on the approach, she could not see the airport beacon. One of the line service technicians reported that the fog was the same as when the Aztec landed; it was just darker.

The Tower Control reported that the approach lights were controlled by the tower and that the "Rabbit," the High Intensity Runway Lighting system, was operating at full intensity at the time of the accident.

The SBN Approach Control transcripts indicated that a twin engine Commander, N107GL, was flying in the vicinity of Elkhart Municipal airport at the time of the accident. The transcript indicated that N107GL was requested to check for an ELT signal. N107GL verified that it was receiving an ELT signal. The Tower Controller reported that N107GL was holding overhead the Elkhart Airport and that it was in radio contact with SBN Approach Control. The Tower Controller reported that he could see the airplane flying overhead the airport, even though the horizontal visibility was poor.

Parties to the investigation included the Federal Aviation Administration, Raytheon Aircraft, and Teledyne Continental Motors.

The aircraft wreckage was released to Phoenix Aviation.

Pilot Information

Certificate:	Airline transport	**Age:**	50,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; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	March 26, 1997
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	7400 hours (Total, all aircraft), 102 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N40HC
Model/Series:	BE-55 BE-55	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	TC-1974
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	November 4, 1998 Annual	**Certified Max Gross Wt.:**	5121 lbs
Time Since Last Inspection:	141 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	3678 Hrs	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	IO-470-L
Registered Owner:	GGT	**Rated Power:**	260 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	EKM ,778 ft msl	**Distance from Accident Site:**	
Observation Time:	18:45 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Unknown	**Visibility**	0.5 miles
Lowest Ceiling:	200 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	9°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	WORTHINGTON , MN (OTG)	**Type of Flight Plan Filed:**	IFR
Destination:	(EKM)	**Type of Clearance:**	IFR
Departure Time:	15:40 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	ELKHART MUNICIPAL AIRPORT EKM	**Runway Surface Type:**	Asphalt
Airport Elevation:	778 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	27	**IFR Approach:**	ILS
Runway Length/Width:	6500 ft / 120 ft	**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal, 1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 1 Serious	**Latitude, Longitude:**	41.719837,-85.97985(est)

Administrative Information

Investigator In Charge (IIC):	Silliman, Jim
Additional Participating Persons:	LARRY POWELL; SOUTH BEND , IN HARROLD BARRENTINE; WICHITA , KS JOHN KENT; SEAGOVILLE , TX
Original Publish Date:	June 23, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=45751