Aviation Investigation Final Report

Location:	Boyne City, Michigan	**Accident Number:**	CEN22FA032
Date & Time:	November 15, 2021, 12:45 Local	**Registration:**	N290KA
Aircraft:	Beech E-90	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Business		

Analysis

While on final approach, the airplane gradually slowed to near its stall speed. About 600 ft beyond the last recorded data, the airplane impacted the ground in a nose-down attitude that was consistent with a stall. Postaccident examination revealed no preaccident mechanical failures or malfunctions that would have contributed to the accident.

Witnesses near the accident site reported very heavy sleet with low visibility conditions, whereas a witness located near the final approach flightpath, about 2 miles before the accident site observed the airplane fly by below an overcast cloud layer with no precipitation present. Based on the witness accounts and weather data, the airplane likely entered a lake effect band of heavy sleet during the final portion of the flight.

The airplane was modified with 5-bladed propellers, and other pilots reported it would decelerate rapidly, especially when the speed/propeller levers were moved to the high rpm (forward) position. The pilot usually flew a larger corporate jet and had not flown the accident airplane for 8 months. The passenger was a student pilot with an interest in becoming a professional pilot.

The pilot's poor airspeed control on final approach was likely influenced by a lack of recency in the turboprop airplane. The workload of inflight deicing tasks may have also contributed to the poor airspeed control. The aerodynamic effects of the heavy sleet that was encountered near the accident site likely contributed to the stall to some degree.

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 sufficient airspeed and his exceedance of the airplane's critical angle of attack while in icing conditions, which resulted in an aerodynamic stall and subsequent ground impact.

Findings

Personnel issues	Aircraft control - Pilot
Environmental issues	Freezing rain/sleet - Contributed to outcome

Factual Information

History of Flight

Approach-IFR final approach	Loss of control in flight (Defining event)

On November 15, 2021, about 1245 eastern standard time, a Beech E-90, N290KA, was destroyed when it was involved in an accident near Boyne City, Michigan. The airline transport pilot and passenger sustained fatal injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 business flight.

A review of automatic dependent surveillance-broadcast (ADS-B) data revealed the airplane departed Oakland County International Airport (PTK), Pontiac, Michigan, at 1150 and climbed to a cruise altitude of 16,000 ft mean sea level (msl) enroute to Boyne City Municipal Airport (N98), Boyne City, Michigan. The airplane descended toward N98 and air traffic control cleared the pilot for the RNAV GPS Rwy 27 approach.

While established on final approach, the airplane gradually slowed from 129 to 88 knots groundspeed over a period of one minute. The last recorded ADS-B data showed the airplane at 88 knots groundspeed, about 3.2 nautical miles from the runway, and about 600 ft above ground level. The airplane impacted the ground about 600 ft beyond the last recorded ADS-B data. The nearest surface winds located about 12 miles north were 360° at 3 knots.

Pilot Information

Certificate:	Airline transport; Private	**Age:**	61,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	February 23, 2021
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 8, 2021
Flight Time:	13000 hours (Total, all aircraft), 700 hours (Total, this make and model)		

The pilot primarily flew a Bombardier Challenger 604 jet, although he had not flown this airplane since June 2021 due to maintenance work on the engines. The pilot completed Challenger 601 recurrency training with CAE in a flight simulator from November 5-8, 2021.

The pilot flew about 700 hours in Beech E-90 airplanes. About 3 years prior to the accident, the pilot started managing the accident airplane, and he last flew the airplane during recurrent flight training on March 22, 2021.

The airplane required one pilot to be operated. The passenger in the cockpit's right seat was a student pilot interested in becoming a professional pilot and was along for the ride.

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N290KA
Model/Series:	E-90	**Aircraft Category:**	Airplane
Year of Manufacture:	1974	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	LW59
Landing Gear Type:	Retractable - Tricycle	**Seats:**	10
Date/Type of Last Inspection:	October 13, 2021 Continuous airworthiness	**Certified Max Gross Wt.:**	10160 lbs
Time Since Last Inspection:	11 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	10491 Hrs as of last inspection	**Engine Manufacturer:**	Honeywell
ELT:	Installed	**Engine Model/Series:**	TPE331-10-511KA
Registered Owner:	N290KA LLC	**Rated Power:**	715 Horsepower
Operator:	N290KA LLC	**Operating Certificate(s) Held:**	None

The airplane had been modified numerous times since 1973 and was equipped with Honeywell TPE331-10 engines, McCauley 5-bladed propellers, and Garmin avionics. The aircraft was the original test vehicle for the Honeywell engine and McCauley propeller supplemental type certificate (STC) development.

The airplane was the first of two modified by the STC. The owner/pilot of the second STC airplane reported that a rapid deceleration on final approach would occur when propeller levers were moved to the high rpm (forward) position, so he normally waited until the airplane was on short final to do so.

A different pilot who flew the accident airplane observed it rapidly decelerate from 135 to 100 knots during level off on one occasion. This pilot normally flew jets and the rapid deceleration was surprising to him. Another pilot who flew the accident airplane stated he normally landed with partial engine power on to avoid the airplane decelerating prematurely.

According to FAA flight testing that was conducted in conjunction with the STC, the stall speed with landing gear down and 0° flaps was 89 knots indicated airspeed. Flight testing results were determined to be satisfactory.

The airplane flight manual included the following caution about icing:

> *Stalling airspeeds should be expected to increase when ice has accumulated on the airplane due to distortion of the wing airflow. Keep a comfortable margin of airspeed above the normal stall airspeed with ice on the airplane. Maintain a minimum of 140 knots during icing conditions to prevent ice accumulation on unprotected surfaces of the wing.*

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KMGN,677 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	12:35 Local	**Direction from Accident Site:**	359°
Lowest Cloud Condition:	Scattered / 1200 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 2400 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	360°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	2°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Pontiac, MI (PTK)	**Type of Flight Plan Filed:**	IFR
Destination:	Boyne City, MI (N98)	**Type of Clearance:**	IFR
Departure Time:	11:50 Local	**Type of Airspace:**	Class E

An airman's meteorological information (AIRMET) for moderate icing was valid for the accident location, which the pilot received during a weather briefing from Leidos.

The accident site was influenced by northwesterly winds flowing across the Great Lakes that resulted in increased moisture. When combined with the low-level trough, bands of lake effect rain and snow shower activity were occurring.

The destination did not have weather reporting capability. The observations of the nearest airports indicated visual flight rules (VFR) to marginal VFR conditions with scattered snow. Visibility conditions were reported as low as ¼ mile when areas of snow moved across the region during the early morning of the accident.

Two witnesses located about ¼ mile southeast of the accident site heard the airplane fly overhead, followed by a loud thud of the accident. The witnesses observed very heavy sleet with low visibility conditions for about 10 minutes prior to and after the accident. The sleet had a high liquid content and would melt quickly after ground impact.

Another witness located near the final approach flightpath, about 2 miles before the accident site observed the airplane fly past his position below an overcast cloud deck. The witness reported that no precipitation was present as the airplane flew by his position.

Airport Information

Airport:	BOYNE CITY MUNI N98	**Runway Surface Type:**	Asphalt
Airport Elevation:	659 ft msl	**Runway Surface Condition:**	
Runway Used:	27	**IFR Approach:**	Global positioning system
Runway Length/Width:	4001 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	45.204687,-84.907979(est)

The airplane impacted into forested terrain on a westerly heading, with broken tree limbs indicating a steep descent of about 70°. The nose was crushed aft and the tail was bent up and over the top of the fuselage like a scorpion. A postimpact fire did not occur. Multiple propeller-cut tree limbs were found immediately east of the accident site.

The power levers, speed/propeller levers, and fuel cutoff levers were found at the accident site in the full forward position. The position of the cockpit deice switches were unable to be determined due to impact damage. The landing gear was in the down position. Three of the four flap actuators indicated a flaps 5° position. No preimpact anomalies were observed with flight control continuity.

Examination at a recovery location revealed the impeller vanes of both engines were bent in the direction opposite of rotation, consistent with ingestion of foreign debris during engine operation. The third stage turbine shrouds of both engines were rotationally scored and the nozzles vanes of both engines displayed metal spray deposits on the convex side of the vanes, consistent with engine rotation, normal internal airflow and an existent combustion process.

Witness marks on both propellers indicated blade angles were 20° to 40° during ground impact. The blade bending, twisting, and overall assembly damage of both propellers was consistent with deformation during the impact sequence. Left and right propeller mounting holes were elongated, the direction of which was consistent with the correct rotational direction.

The deicing system was examined at the recovery location, and the bleed air regulator valve, de-ice distributor valve, and an 8-inch section of the left wing surface de-ice manifold assembly were removed for further testing. No preaccident mechanical failures or malfunctions were observed that would have contributed to the accident.

Administrative Information

Investigator In Charge (IIC):	Folkerts, Michael
Additional Participating Persons:	Todd Gentry; FAA - AVP-100; Washington, DC Peter Basile; Textron Aviation; Wichita, KS Jennifer McDuffie; Honeywell Aerospace; Phoenix, AZ Kevin Stahl; McCauley Propeller Systems ; Wichita, KS
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