Aviation Investigation Final Report

Location:	Ray, Michigan	**Accident Number:**	CEN22LA336
Date & Time:	July 24, 2022, 14:50 Local	**Registration:**	N60ED
Aircraft:	Beech A36	**Aircraft Damage:**	Substantial
Defining Event:	Collision during takeoff/land	**Injuries:**	3 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that during the takeoff roll, when the airplane reached 70 knots indicated airspeed (KIAS), he rotated the airplane for takeoff. He pitched the nose of the airplane for the takeoff climb and at 77 KIAS he retracted the landing gear. The airplane drifted to the right, the right wing dipped, and the nose began to pitch down. When the pilot checked airspeed, it indicated 64 KIAS and the airplane felt “sloshy.” The pilot reported the airplane was descending toward the trees at the end of the runway as the stall warning horn sounded. The airplane then collided with the trees and descended to impact with the terrain before a fire erupted. The pilot and passengers were able to exit the airplane before it was engulfed by the flames. The pilot reported the engine rpm’s did not diminish and there were no abrupt changes in power during the takeoff.

A witness saw the airplane as it departed runway 28 (2,495 ft long). According to the witness, the airplane rotated about 3/4 of the length down the runway. The witness then saw the landing gear retract and the airplane appeared to struggle to climb. The wings wobbled and the airplane yawed to the right.

An examination of the airframe, engine, and turbocharger did not detect any preimpact anomalies.

The airplane was modified via supplemental type certificate with a turbocharger that allowed for operation of the airplane at weights above the original airplane’s type certificate design. Using the original manufacturer’s performance chart, takeoff distances and airspeeds are increased, and for the accident flight, the pilot rotated the airplane between 5 to 16 knots early depending on his expectation of a 50 ft obstacle. This early rotation likely rendered the airplane incapable of climbing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's early rotation on takeoff, which resulted in insufficient airspeed and an inability to gain sufficient altitude to clear the trees.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Climb capability - Not attained/maintained
Aircraft	Airspeed - Not attained/maintained

Factual Information

History of Flight

Initial climb	Collision during takeoff/land (Defining event)

On July 24, 2022, about 1450 eastern daylight time, a Beech A36 airplane was substantially damaged when it was involved in an accident near Ray, Michigan. The pilot and two passengers were seriously injured. The airplane was operated under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight.

The pilot reported that during the takeoff roll, when the airplane reached 70 KIAS, he rotated the airplane for takeoff. He pitched the nose of the airplane for the takeoff climb and upon reaching 77 KIAS he retracted the landing gear. The airplane then started to drift to the right, the right wing dipped, and the nose began a slight pitch down. When the pilot checked airspeed, it indicated 64 KIAS and the airplane felt “sloshy.” The pilot reported the airplane was descending toward the trees at the end of the runway and the stall warning horn sounded. The airplane collided with the trees and descended to impact with the terrain before a fire erupted. The pilot and passengers were able to exit the airplane before it was engulfed by the flames. The pilot reported the engine rpm’s never seemed to diminish and there were no abrupt changes in power during the takeoff.

A witness saw the airplane as it departed runway 28 (2,495 ft long). According to the witness, the airplane rotated about 3/4 of the length down the runway. The landing gear was seen to retract, and the airplane appeared to struggle to climb. The wings wobbled and the airplane yawed to the right. The airplane did not climb and then collided with the trees. All three occupants were hospitalized.

A review of information on file with the Federal Aviation Administration (FAA) showed the accident airplane was modified via supplemental type certificate to be turbo normalized. Examination of the engine and turbocharger did not detect any preimpact anomalies which would have precluded normal operation of the engine.

The pilot reported that before the flight he fully fueled the airplane. He estimated the weight and balance calculations to be 3,829 lbs and 83.84 inches. The estimated takeoff distance to clear a 50 ft obstacle was about 2,200 ft.

Performance charts provided by Textron Aviation showed that at a takeoff weight of 3,650 lbs, the rotation speed is 73 knots for no obstacle and 84 knots for a 50 ft obstacle. Calculated takeoff distance for a 50 ft obstacle was 2,200 ft. However, according to the Tornado Alley Airplane Flight Manual Supplement, when modified the airplane was approved to operate at a

maximum gross weight of 4,000 lbs. When operating at increased weights, pilots should expect an increased takeoff distance of up to 30%, a decreased rate-of-climb of up to 13%, an increased stall speed of up to 7%, and increased takeoff speeds of 2 knots. For the accident flight, the takeoff distance was calculated to be 2,860 ft and rotation speed would be 75 knots (no obstacle) or 86 knots for a 50 ft obstacle.

In the FAA publication, The Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25B), dated 2016, Chapter 11, Aircraft Performance, states that if "the pilot attempts to climb out of ground effect without first attaining normal climb pitch attitude and airspeed, the airplane may inadvertently enter the region of reversed command at a dangerously low altitude. Even with full power, the airplane may be incapable of climbing or even maintaining altitude. The pilot's only recourse in this situation is to lower the pitch attitude in order to increase airspeed, which inevitably results in a loss of altitude.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	44,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	June 15, 2020
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	6300 hours (Total, all aircraft), 263 hours (Total, this make and model), 2685 hours (Pilot In Command, all aircraft), 25.4 hours (Last 90 days, all aircraft), 2.3 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N60ED
Model/Series:	A36	**Aircraft Category:**	Airplane
Year of Manufacture:	1985	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E-2241
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	July 22, 2022 Annual	**Certified Max Gross Wt.:**	4000 lbs
Time Since Last Inspection:	2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3633 Hrs	**Engine Manufacturer:**	Continental
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO-550B
Registered Owner:	On file	**Rated Power:**	300 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:	KMTC,580 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	14:56 Local	**Direction from Accident Site:**	155°
Lowest Cloud Condition:	Scattered / 5000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 20000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.78 inches Hg	**Temperature/Dew Point:**	29°C / 23°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Ray, MI	**Type of Flight Plan Filed:**	IFR
Destination:	South Bend, IN (KSBN)	**Type of Clearance:**	IFR
Departure Time:		**Type of Airspace:**	Class G

Airport Information

Airport:	RAY COMMUNITY 57D	**Runway Surface Type:**	Asphalt
Airport Elevation:	632 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	28	**IFR Approach:**	None
Runway Length/Width:	2495 ft / 60 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Serious	**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	3 Serious	**Latitude, Longitude:**	42.7383,-82.8885(est)

Administrative Information

Investigator In Charge (IIC):	Aguilera, Jason
Additional Participating Persons:	Bruce Arthurs; FAA Flight Standards; Belleville, MI
Original Publish Date:	March 20, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=105563