Aviation Investigation Final Report

Location:	Santa Fe, New Mexico	**Accident Number:**	GAA16CA320
Date & Time:	June 15, 2016, 21:40 Local	**Registration:**	N60189
Aircraft:	Beech 77	**Aircraft Damage:**	Substantial
Defining Event:	Loss of lift	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that during the initial climb in night visual meteorological conditions the airplane "was not climbing well." The pilot further reported for about 15 minutes he maneuvered the airplane over a highway, and the airplane still would not gain altitude. Subsequently, he reported that was "unable to maintain adequate terrain separation" and landed on the highway. During the landing roll on the highway, the pilot swerved to avoid a car and struck a road sign, which substantially damaged the left wing.

During postaccident correspondence with the pilot, he reported that the airplane was "160 lbs. over gross with high estimates on bags, likely closer to 140 over gross."

The Federal Aviation Administration (FAA) Pilot's Handbook of Aeronautical Knowledge (PHAK) in part states: "The pilot should always be aware of the consequences of overloading. An overloaded aircraft may not be able to leave the ground, or if it does become airborne, it may exhibit unexpected and unusually poor flight characteristics. If not properly loaded, the initial indication of poor performance usually takes place during takeoff."

The pilot also reported that a cold compression check was performed on the engine after the accident. He reported that the "compressions were 25/80, 42/80, and both rear cylinders were 72/80."

The Service Instructions for cylinder compression checks provided by Textron Lycoming in part states: "Operate the engine until normal cylinder head and oil temperatures are attained; then shut down the engine making sure that magneto switches and fuel supply valves are shut off. Proceed with the test as soon as possible after shut down." The cylinder compression measured was not completed in accordance with the manufacture's service instructions.

The FAA provides guidance on how density altitude affects aircraft performance. The density altitude about the time of departure was 8,202 feet, the pressure altitude was 6,217 feet, and the temperature was

20 Celsius (68 Fahrenheit). According to the FAA Koch Chart, the airplane would have likely experienced a 145% increase to the "normal takeoff distance" and a 65% decrease in a normal climb rate. The FAA PHAK in part states: "In extreme conditions, such as high gross weight, high density altitude, and high temperature, a deficiency of airspeed during takeoff may permit the aircraft to become airborne but be incapable of sustaining flight out of ground effect."

The pilot also reported that he had been on a four day trip and had worked more than 12 hours each day, including the day of the accident. He reported that, "fatigue significantly affected decision making as [the] pilot had opportunities to attempt to land back at [the] airport, abort [the] takeoff, or land closer on [the] highway avoiding the vehicle." The FAA PHAK in part states: "Fatigue is frequently associated with pilot error. Some of the effects of fatigue include degradation of attention and concentration, impaired coordination, and decreased ability to communicate. These factors seriously influence the ability to make effective decisions."

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's decision to takeoff over the maximum takeoff weight in high density altitude conditions, which resulted in an inability to climb above terrain, a forced landing, and a collision with a road sign. Contributing to the accident was the pilot's decision to fly in a fatigued mental state.

Findings

Aircraft	Maximum weight - Capability exceeded
Aircraft	Climb capability - Attain/maintain not possible
Personnel issues	Decision making/judgment - Pilot
Personnel issues	(general) - Pilot
Environmental issues	High density altitude - Decision related to condition
Environmental issues	Sign/marker - Contributed to outcome

Factual Information

History of Flight

Prior to flight	Preflight or dispatch event
Initial climb	Other weather encounter
Initial climb	Loss of lift (Defining event)
Landing	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Commercial	**Age:**	31,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	February 23, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	April 19, 2016
Flight Time:	(Estimated) 5700 hours (Total, all aircraft), 8 hours (Total, this make and model), 5300 hours (Pilot In Command, all aircraft), 100 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		**Age:**	Male
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	3-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N60189
Model/Series:	77 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1979	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	WA-7
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	November 12, 2015 100 hour	**Certified Max Gross Wt.:**	1675 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2730 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	C91A installed, not activated	**Engine Model/Series:**	O-235-L2C
Registered Owner:	On file	**Rated Power:**	115 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KSAF,6348 ft msl	**Distance from Accident Site:**	4 Nautical Miles
Observation Time:	03:53 Local	**Direction from Accident Site:**	180°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots / None	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.06 inches Hg	**Temperature/Dew Point:**	20°C / -10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Santa Fe, NM (SAF)	**Type of Flight Plan Filed:**	VFR
Destination:	SPANISH FORK, UT (U77)	**Type of Clearance:**	None
Departure Time:	21:22 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	SANTA FE MUNI SAF	**Runway Surface Type:**	Asphalt
Airport Elevation:	6348 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	20	**IFR Approach:**	None
Runway Length/Width:	8366 ft / 150 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	35.582221,-106.105834(est)

Preventing Similar Accidents

Manage Risk: Good Decision-making and Risk Management Practices are Critical (SA-023)

The Problem

Although few pilots knowingly accept severe risks, accidents can also result when several risks of marginal severity are not identified or are ineffectively managed by the pilot and compound into a dangerous situation. Accidents also result when the pilot does not accurately perceive situations that involve high levels of risk. Ineffective risk management or poor aeronautical decision-making can be associated with almost any type of fatal general aviation accident.

What can you do?

- Develop good decision-making practices that will allow you to identify personal attitudes that are hazardous to safe flying, apply behavior modification techniques, recognize and cope with stress, and effectively use all resources. Understand the safety hazards associated with human fatigue and strive to eliminate fatigue contributors in your life.
- Understand that effective risk management takes practice. It is a decision-making process by which you can systematically identify hazards, assess the degree of risk, and determine the best course of action.
- Be honest with yourself and your passengers about your skill level and proficiency. Refuse to allow external pressures, such as the desire to save time or money or the fear of disappointing passengers, to influence you to attempt or continue a flight in conditions in which you are not comfortable.
- Be honest with yourself and the FAA about your medical condition. If you have a medical condition or are taking any medication, do not fly until your fitness for flight has been thoroughly evaluated.
- Plan ahead with flight diversion or cancellation alternatives, and brief your passengers about the alternatives before the flight.

See https://www.ntsb.gov/Advocacy/safety-alerts/Documents/SA-023.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Gerhardt, Adam
Additional Participating Persons:	John Schroeder; FAA; Phoenix, AZ
Original Publish Date:	August 31, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	This accident report documents the factual circumstances of this accident as described to the NTSB.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93398