



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	Broomfield, Colorado	Accident Number:	CEN22FA208
Date & Time:	May 22, 2022, 11:49 Local	Registration:	N85CT
Aircraft:	Piper PA-32-260	Aircraft Damage:	Substantial
Defining Event:	Unknown or undetermined	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and pilot-rated passenger conducted a personal flight that included troubleshooting an avionics issue. Following an extended taxi of longer than 1 hour, the airplane departed with a longer-than-normal ground roll and made a shallower-than-normal climb out. About ½ mile past the departure end of the runway, the airplane turned left and descended toward a road, which was a flight profile that was consistent with a forced landing attempt. The airplane impacted the road and then a large tree, which separated the engine and cockpit area from the fuselage, resulting in substantial damage.

Postaccident examination of the airframe and engine did not reveal any indication of a mechanical failure or malfunction that would have precluded normal operation.

Recorded data indicated engine performance during the accident takeoff was significantly lower than a previous takeoff. The engine power increased very slowly on the accident takeoff roll and fuel flow was about 45% less than the previous takeoff. The reason for the lower fuel flow during the accident takeoff could not be conclusively determined. However, one possibility was that the pilot(s) leaned the mixture during the extended ground operations of more than 1 hour and subsequently forgot to enrich the mixture before takeoff.

A second possibility for the lower fuel flow was carburetor ice. The weather conditions at the time of the accident were conducive to serious carburetor icing at glide power. Carburetor ice can affect the fuel flow by disturbing the venturi effect in the carburetor throat that draws fuel into the cylinders. The result is lower fuel flows.

Toxicology testing of the pilot did not identify any tested-for substances. The pilot-rated passenger's toxicology indicated use of a number of substances; however, indications were limited to the urine and it is unlikely they were contributory to the accident.

The slow acceleration and extended ground roll due to the degraded engine performance necessitated an abort that was not accomplished by the pilots. Since a purpose of the flight was troubleshooting an avionics issue, it is possible that the pilots were distracted by the avionics issue during the takeoff roll. This distraction could have led to inattention to ensuring that the fuel flow/engine performance was adequate during the takeoff roll and to abort the takeoff.

Probable Cause and Findings

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

The pilot's failure to abort the takeoff due to degraded engine performance. Contributing to the accident was the reduced performance of the engine, the reason for which could not be determined.

Findings

Personnel issues	Decision making/judgment - Pilot
Aircraft	(general) - Unknown/Not determined
Environmental issues	Tree(s) - Contributed to outcome
Environmental issues	Conducive to carburetor icing - Effect on equipment

Factual Information

History of Flight

Initial climb	Unknown or undetermined (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

On May 22, 2022, about 1149 mountain daylight time, a Piper PA-32-260, N85CT, was substantially damaged when it was involved in an accident near Broomfield, Colorado. The pilot and pilot-rated passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to automatic dependent surveillance-broadcast (ADS-B) information, the airplane departed Erie Municipal Airport (EIK) on Runway 16. About 3,000 ft from the departure end of the runway, the airplane made a left turn, descended, and impacted terrain.



Figure 1. Accident Flight Track with Recorded Altitude and Indicated Airspeed

Two experienced pilots who lived along the airplane’s flight path reported hearing abnormal engine noises. The first pilot, who was located about 800 ft from the departure end of Runway 16, observed the airplane fly past about 50 to 100 ft above ground level (agl). About 5 seconds later, he heard several popping noises.

The second pilot was located about 1,000 ft to the west of the accident site and reported hearing a “loud carburetor cough” followed a few seconds later by a “quieter carburetor cough.” Within 10 seconds, he heard the airplane impact the ground.

Pilot Information

Certificate:	Private	Age:	50, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	June 19, 2020
Occupational Pilot:	No	Last Flight Review or Equivalent:	July 24, 2021
Flight Time:	149 hours (Total, all aircraft), 69 hours (Total, this make and model), 15 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Pilot-rated passenger Information

Certificate:	Private	Age:	59, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	February 17, 2022
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	1900 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N85CT
Model/Series:	PA-32-260	Aircraft Category:	Airplane
Year of Manufacture:	1966	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	32-789
Landing Gear Type:	Tricycle	Seats:	6
Date/Type of Last Inspection:	May 2, 2021 Annual	Certified Max Gross Wt.:	3400 lbs
Time Since Last Inspection:	70 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	3571 Hrs as of last inspection	Engine Manufacturer:	LYCOMING
ELT:	C91A installed, not activated	Engine Model/Series:	O-540 SERIES
Registered Owner:	On file	Rated Power:	250 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

A review of maintenance logs revealed an avionics upgrade was completed on February 4, 2022, that included installation of a Garmin G5 and Dynon primary flight/multi-function displays. The pilot-rated passenger assisted with the avionics installation.

The airplane flew about 22 hours between the time the avionics were upgraded and the time of the accident. The purpose of the accident flight included troubleshooting an avionics issue.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KEIK, 5132 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	11:55 Local	Direction from Accident Site:	345°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Broken / 4600 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	8 knots / None	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	190°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.2 inches Hg	Temperature/Dew Point:	12°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Erie, CO (EIK)	Type of Flight Plan Filed:	None
Destination:	Erie, CO (EIK)	Type of Clearance:	None
Departure Time:	11:49 Local	Type of Airspace:	Class G

The meteorological conditions were conducive to serious carburetor icing at glide power.

Airport Information

Airport:	Erie Municipal Airport EIK	Runway Surface Type:	Concrete
Airport Elevation:	5119 ft msl	Runway Surface Condition:	Dry
Runway Used:	16	IFR Approach:	None
Runway Length/Width:	4700 ft / 60 ft	VFR Approach/Landing:	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	1 Fatal	Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	39.996526,-105.04271

The airplane impacted a grassy area in a residential community. About 35 ft beyond the point of initial impact, six propeller strike marks spaced about 1 ft apart were located on a paved road. The airplane bounced and subsequently impacted a large tree about 100 ft from the propeller strike marks, which resulted in the engine and cockpit area separating from the remainder of the fuselage.



Figure 2. Airplane at Accident Site

All components of the airplane were observed at the accident site. Fuel was recovered from the left main, right main, and right wingtip fuel tanks, with no indications of contamination. The fuel bowl contained fuel that was free from debris or water.

The electric fuel pump and fuel selector tested normally. The carburetor floats were unremarkable and carburetor inlet screen was free of debris.

The electric fuel pump switch was found in the on position, and the primer pump handle was in and latched. The throttle and propeller control handles were fully forward. The mixture control knob was found extended about 1 inch out from the panel. The carburetor heat position could not be determined.

Flight control cable continuity was established and the flap handle was found positioned to 10°. The pitch trim screw extension correlated to partial nose down trim.

The crankshaft was rotated by hand, producing normal valve movement. Thumb compression was achieved on 5 of the 6 cylinders; however, the No.2 cylinder did not produce compression.

The No.2 cylinder was removed, revealing the presence of carbon deposits between the exhaust valve and seat.

Postaccident examinations revealed no evidence of a mechanical failure or malfunction that would have precluded normal operation.

Medical and Pathological Information

An autopsy was performed on the pilot by the Office of the Coroner, Adams and Broomfield Counties, Colorado. The cause of death was multiple blunt force injuries. Toxicology testing performed by the FAA's Forensic Sciences Laboratory did not identify any tested-for substances.

An autopsy was performed on the pilot-rated passenger by the Office of the Coroner, Adams and Broomfield Counties, Colorado. The cause of death was multiple blunt force injuries. Toxicology testing performed by the FAA's Forensic Sciences Laboratory identified tamsulosin, morphine, its metabolite hydromorphone, and dihydrocodeine in urine; However, none of these were identified in cavity blood.

Additional Information

Performance Study

A performance study was conducted using data recovered from the primary flight and multi-function displays. Altitude, airspeed, and engine performance were compared for the accident flight and a previous flight, which operated from the same runway and about the same time of day, and which were the only two flights with data recorded after the Dynon avionics were installed.

On the accident takeoff roll, engine power was slow to increase relative to the previous flight, and the airplane did not accelerate much beyond the rotation speed. The accident takeoff rate of climb was 200-300 feet per minute less than the previous flight.

The airplane pitched up to over 20° during the accident takeoff, about twice the pitch attitude obtained during the previous takeoff. The airplane reached a maximum altitude of about 230 ft above ground level before pitching down, descending, and impacting the ground.

Exhaust gas temperatures (EGTs) of cylinders Nos. 1, 5, and 6 were 70°F, 65°F, and 130°F hotter for the accident takeoff compared to the previous takeoff, respectively, while cylinders Nos. 2, 3, and 4 had similar EGT's to the previous takeoff.

The fuel flow was about 5 gallons per hour (gph) less on the accident takeoff than the previous takeoff (16 gph vs. 11 gph, or about 45% less). Fuel flow is proportional to horsepower produced by the engine. Engine RPM and manifold pressure for the two takeoffs were similar.

The reason for the lower fuel flow during the accident takeoff was not conclusive. However, one possibility was that the pilot(s) leaned the mixture during the extended ground operations of more than 1 hour and subsequently forgot to enrich the mixture before takeoff. Leaning the mixture would be appropriate to avoid fouling the spark plugs.

A second possibility for the lower fuel flow was carburetor ice. Carburetor ice can affect the fuel flow by disturbing the venturi effect in the carburetor throat that draws fuel into the cylinders. The result is lower fuel flows. According to Federal Aviation Administration (FAA) Special Airworthiness Information Bulletin CE-09-35, Carburetor Icing Prevention, the probability of carburetor icing during the weather conditions of the accident was serious at glide power.

Rejected Takeoff Information

The airplane owner's handbook indicates a takeoff distance (which includes a climb to 50 ft) of about 1,300 ft based on the conditions of the accident. According to inflight data, the accident ground roll was about 2,300 ft.

The FAA Airplane Flying Handbook (FAA-H-8083-3C) includes the following information related to a rejected takeoff:

Emergency or abnormal situations can occur during a takeoff that require a pilot to reject the takeoff while still on the runway. Circumstances such as a malfunctioning powerplant, inadequate acceleration, runway incursion, or air traffic conflict may be reasons for a rejected takeoff. Prior to takeoff, the pilot should identify a point along the runway at which the airplane should be airborne. If that point is reached and the airplane is not airborne, immediate action should be taken to discontinue the takeoff. When properly planned and executed, the airplane can be stopped on the remaining runway without using extraordinary measures, such as excessive braking that may result in loss of directional control, airplane damage, and/or personal injury. The POH/AFM ground roll distances for take-off and landing added together provide a good estimate of the total runway needed to accelerate and then stop.

Administrative Information

Investigator In Charge (IIC): Folkerts, Michael

Additional Participating Persons: Lorenzo Robledo; FAA, Flight Standards District Office; Denver, CO
Troy Helgeson; Lycoming Engines; Williamsport, PA
Kathryn Whitaker; Piper Aircraft; Vero Beach , FL
Les Doud; Hartzell Propeller; Piqua, OH
Don Jones; Dynon Avionics ; Woodinville, WA

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Investigation Class: [Class 3](#)

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=105113>

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