Aviation Investigation Final Report

Location:	Midland, Michigan	**Accident Number:**	CEN20LA373
Date & Time:	September 1, 2020, 12:45 Local	**Registration:**	N5939P
Aircraft:	Piper PA24	**Aircraft Damage:**	Substantial
Defining Event:	Fuel starvation	**Injuries:**	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported he and the pilot-rated passenger departed on the first flight of the day with the right fuel tank full of fuel and the left fuel tank partially full. He did not state which fuel tank they had selected for the flight which lasted about 30 minutes, but that the pilot-rated passenger flew this leg. He stated they made a full stop landing, taxied back for another takeoff, and after the second landing they taxied to the fuel pumps where they added 18 gallons of fuel to the left fuel tank.

The pilot reported that he has little recall of the accident portion of the flight, but that he was likely flying this portion of the flight. Automatic dependent surveillance-broadcast data indicated that the airplane took off and climbed straight ahead to an altitude of about 2,550 ft mean sea level (msl). It then began a right turn back towards the departure airport. The last recorded data point showed the airplane at an indicated altitude of 675 ft msl. The airplane struck a fence and a large grass-covered mound of dirt before it came to rest upright. A witness on the ground heard the pilot state over the radio that they had lost engine power and would perform a forced landing.

A postaccident examination of the airframe and engine revealed no mechanical anomalies that would have precluded normal operations. The fuel selector valve was selected to the right fuel tank. The right fuel tank bladder was intact and did not contain any fuel. The fuel lines on the right side were also empty of fuel. There was no evidence of fuel staining or fuel blight on the right side of the airplane. The left fuel tank bladder was impact damaged and contained a small amount of fuel. Fuel blighting was observed under the left wing during recovery. In addition, fuel staining was observed under the left wing.

The available evidence suggests that the engine lost power due to fuel starvation in that the right fuel tank was empty and the left tank contained an unknown amount of fuel at the time of the accident.

Probable Cause and Findings

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

The loss of engine power due to fuel starvation.

Findings

Aircraft	Fuel - Fluid level
Personnel issues	Use of equip/system - Pilot

Factual Information

History of Flight

Initial climb	Fuel starvation (Defining event)
Emergency descent	Off-field or emergency landing
Landing-flare/touchdown	Collision with terr/obj (non-CFIT)

On September 1, 2020, about 1245 eastern daylight time, a Piper PA-24-250 airplane, N5939P, was substantially damaged when it was involved in an accident near Midland, Michigan. The pilot-rated passenger was fatally injured, and the pilot was seriously 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) data, the airplane departed Home Acres Sky Ranch Airport (Y91), Lake City, Michigan, about 1125, and arrived at Jack Barstow Airport (IKW), Midland, Michigan, about 1205. The ADSB data were consistent with a touch-and-go landing followed by a full stop landing.

The pilot stated he he and the pilot-rated passenger, who was his wife, preflighted the airplane, and the right fuel tank was full, and the left fuel tank was "partially full." According to the pilot, he and his wife then flew to IKW that morning; she was the pilot flying during that leg of the trip. She landed and taxied back for takeoff. After the second landing they taxied to the fuel pumps, refueled the left fuel tank with 18 gallons of 100-LL aviation-grade gasoline, and prepared for the next leg of their journey. He stated that the right tank was full of fuel.

The pilot recalled that he was likely the pilot flying for the next leg of their flight. He recalled taxiing the airplane for takeoff and performing an engine runup before takeoff. He did not recall anything after the takeoff roll.

ADS-B data indicated that the airplane took off about 1237 and climbed straight ahead to an altitude of about 2,550 ft mean sea level (msl). It then began a right turn back towards IKW. The last recorded data point showed the airplane at 1244:34 at an indicated altitude of 675 ft msl. The airplane struck a large grass-covered mound of dirt before it came to rest upright.

According to a person who monitored the common traffic advisory frequency at the airport, the pilot reported an engine failure and stated that he would conduct a forced landing to the field.

Pilot Information

Certificate:	Private	**Age:**	64,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:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	BasicMed	**Last FAA Medical Exam:**	August 7, 2020
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 1015 hours (Total, all aircraft), 900 hours (Total, this make and model), 30 hours (Last 90 days, all aircraft)		

Pilot-rated passenger Information

Certificate:	Private	**Age:**	64,Female
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:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	August 3, 2019
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 600 hours (Total, all aircraft), 80 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N5939P
Model/Series:	PA24	**Aircraft Category:**	Airplane
Year of Manufacture:	1959	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-1029
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	June 16, 2020 Annual	**Certified Max Gross Wt.:**	2899 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	4953.4 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:		**Engine Model/Series:**	O-540-A1A5
Registered Owner:	On file	**Rated Power:**	250 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:	IKW,635 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	12:55 Local	**Direction from Accident Site:**	180°
Lowest Cloud Condition:	Scattered / 3100 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 6000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.89 inches Hg	**Temperature/Dew Point:**	23°C / 17°C
Precipitation and Obscuration:			
Departure Point:	Midland, MI (IKW)	**Type of Flight Plan Filed:**	None
Destination:	Lake City, MI (Y91)	**Type of Clearance:**	None
Departure Time:	14:37 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious	**Latitude, Longitude:**	43.758056,-84.266113

The airplane came to rest about 50 ft west of the dirt mound. Impact damage was observed to a barbed wire fence. About 15 ft west of the fence, a second dirt mound displayed an area of freshly disturbed earth similar in width to the airplane's fuselage. A faint odor similar to aviation fuel was noted. An area of blighted grass was observed around the left wing root extending 10 ft to the southwest. The landowner indicated that the grass was alive before the accident. The main wreckage included the empennage, fuselage, both wings, and the engine and propeller assembly.

The flaps were in the up position and the flap handle appeared to be stowed. The fuel selector remained in place within the cabin floor. The selector handle was positioned to the right fuel tank. When the fuel selector was removed from the airplane, fuel emerged from the fuel line to the left fuel tank; no fuel emerged from the fuel line to the right fuel tank. When tested with light air pressure, the fuel selector functioned as intended, with a tactile detent at each position. The belly of the airplane was crushed upward and aft, and blue staining was present. The gascolator appeared undamaged and the valve was closed; no fuel was present in the bowl. The gascolator bowl was removed and no contaminates were observed within.

The left fuel cap remained installed in the left tank filler. A small amount of fuel was observed in the bottom of the bladder. During recovery of the aircraft, fuel was seen streaming from the left wing root. The fuel bladder inspection panel was removed, and a tear to the inboard end of the left fuel bladder was observed. No fuel staining was noted within the wing root.

The right fuel cap remained installed in the right tank filler. A small amount of fuel was observed on the bottom of the bladder. During recovery, no fuel was observed to spill from the right wing. The right fuel bladder inspection panel was removed, and no damage to the right fuel bladder was observed. No fuel staining was noted within the wing root.

The left aileron remained attached to the wing, the left aileron bellcrank and stops appeared undamaged, and the aileron cables remained attached. The right aileron remained attached to the wing, the right aileron bellcrank and stops appeared undamaged, and the aileron cables remained attached.

The vertical stabilizer and rudder remained attached to the empennage, and no damage was apparent to either. The rudder cables remained attached to the rudder control horn and could be traced to the rudder pedal bar. The rudder stops appeared undamaged.

The engine remained attached to the fuselage but was displaced aft and downward. The carburetor was broken away from the engine oil sump and displaced aft. The fuel pump screens were removed from the electric fuel pumps and no blockages were noted. When the screens were removed from the pumps, about 1-2 ounces of fuel was recovered; when tested with Kolor-Kut water finding paste, no reaction to the sample was observed.

During the recovery of the airplane, the blighted grass was seen to extend under the left wing root and left forward side of the fuselage. No blighted grass was noted beneath the right wing or right side of the fuselage.

The crankshaft was rotated by turning the propeller and continuity of the crankshaft to the rear gears and to the valvetrain was confirmed. Normal valve action was observed from all intake and exhaust valves. Compression and suction were observed from all six cylinders. The spark plug electrodes exhibited gray coloration and worn normal condition.

The carburetor throttle control arm was observed about 1/8 inch from the idle speed stop. The mixture control arm was observed in a mid-range position. The carburetor induction air box was crushed and the position of the carburetor heat control arm was undetermined. The carburetor was partially disassembled, and no liquid was observed in the float bowl. No damage to the black composite floats or other internal components was noted. No liquid drained from the carburetor fuel inlet hose when it was removed. The fuel inlet screen was partially crushed but no debris was observed in the screen.

The engine driven fuel pump was removed and no liquid drained from the inlet or outlet hoses when they were removed. No liquid drained from the pump as it was removed and tilted on its side. The pump was partially disassembled, and no damage noted to the rubber diaphragms or internal check valves.

Administrative Information

Investigator In Charge (IIC):	Scott, Arnold
Additional Participating Persons:	Thomas G Kozura; FAA Flight Standards District Office; Grand Rapids, MI Kathryn Whitaker; Piper Aircraft Corporation; Vero Beach, FL Ryan Enders; Lycoming; Williamsport, PA
Original Publish Date:	October 12, 2022
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=101897