



# Aviation Investigation Final Report

<b>Location:</b>	Middlefield, Ohio	<b>Accident Number:</b>	ERA23LA112
<b>Date &amp; Time:</b>	January 18, 2023, 09:03 Local	<b>Registration:</b>	N101MA
<b>Aircraft:</b>	Piper PA-31-350	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Runway excursion	<b>Injuries:</b>	6 None
<b>Flight Conducted Under:</b>	Part 135: Air taxi & commuter - Non-scheduled		

## Analysis

While enroute in instrument meteorological (IMC) conditions, the pilot of the twin-engine, piston-powered airplane declared an emergency following a loss of power to the right engine. The pilot secured the engine and was provided vectors by air traffic control for an instrument approach procedure at the nearest airport, which he successfully completed. The pilot reported that he flew the approach and landing with the wing flaps retracted and visually acquired the runway about 500 ft above the ground. The airplane touched down on the first third of the runway at 120 knots. The pilot knew he would not be able to stop the airplane on the 3,500-ft-long runway but committed to the landing rather than risking a single-engine go-around in IMC. After landing, the airplane continued beyond the departure end of the runway and impacted a berm, collapsing the landing gear and resulting in substantial damage to the airplane.

Examination of the engine revealed catastrophic damage consistent with detonation and oil starvation. The damage to the No. 5 cylinder was consistent with a subsequent overpressurization of the crankcase, which likely expelled the crankshaft nose seal and the oil supply. Detonation of the cylinder(s) can create excessive crankcase pressures capable of expelling the crankshaft nose seal. The crankshaft nose seal displacement likely created a rapid loss of oil and the resulting oil starvation of the engine. The fractured connecting rod and high-temperature signatures were consistent with oil starvation. No source or anomaly that would result in engine detonation was identified.

According to the Pilot's Operating Handbook (POH) for the accident airplane, during a single-engine inoperative approach, the pilot should maintain an airspeed of 116 kts indicated (KIAS) or above until landing is assured. Once landing is assured, the pilot should extend the gear and flaps, slowly retard the power on the operative engine, and land normally. The airplane's best single-engine rate of climb speed (blue line) was 106 KIAS, and its minimum controllable

airspeed with one engine inoperative (Vmca) was 76 KIAS. The maximum speed for full flap extension (40°) was 132 KIAS. The POH also stated that a single-engine go-around should be avoided if at all possible.

The pilot's decision to commit to the landing was reasonable given the circumstances and the guidance provided by the POH; however, it is likely that his decision to conduct the landing without flaps and the airplane's excessive airspeed at touchdown resulted in the runway overrun.

## Probable Cause and Findings

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

A runway overrun during a precautionary landing following a total loss of right engine power due to detonation and subsequent oil starvation. Contributing was the pilot's failure to lower the flaps and the excessive airspeed at touchdown.

### Findings

<b>Aircraft</b>	Recip engine power section - Failure
<b>Aircraft</b>	Surface speed/braking - Capability exceeded
<b>Personnel issues</b>	Aircraft control - Pilot
<b>Personnel issues</b>	Lack of action - Pilot
<b>Aircraft</b>	TE flap control system - Not used/operated

## Factual Information

### History of Flight

<b>Enroute</b>	Loss of engine power (partial)
<b>Landing-landing roll</b>	Runway excursion (Defining event)

On January 18, 2023, at 0903 eastern standard time, a Piper PA-31-350, N101MA, was substantially damaged when it was involved in an accident at Geauga County Airport (7GA), Middlefield, Ohio. The airline transport pilot and five passengers were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 135 non-scheduled passenger flight.

The purpose of the flight was to pick up a sixth passenger in Detroit, Michigan, before continuing to Minneapolis, Minnesota. As the airplane climbed through about 6,000 ft mean sea level (msl) in instrument meteorological conditions (IMC), the pilot observed oil leaking from the right engine nacelle. When the airplane reached about 7,400 ft msl, the pilot noted a loss of right engine power. He secured the engine, declared an emergency, requested to divert to the closest airport, and the air traffic controller vectored the airplane for the RNAV RWY 11 approach at 7GA. The pilot successfully completed the approach and reported that the airplane touched down in the “first one-third” of the landing runway at an airspeed “about 120 knots with zero flaps.”

The pilot reported to a Federal Aviation Administration (FAA) inspector that he visually acquired the runway about 500 ft above the ground and knew he would not stop the airplane before it reached the departure end of the 3,500-ft-long runway, but chose to continue rather than abort the landing with one engine inoperative and climb the airplane back into IMC for another instrument approach.

The airplane overran the departure end of the runway, continued through the grass overrun, and impacted a hill and a fence before coming to rest upright about 600 ft beyond the runway end. All three landing gear collapsed and the airplane sustained substantial damage to the wings and fuselage.

According to FAA and maintenance records, the airplane was manufactured in 1977 and was powered by two Lycoming TIO-540-J2BD, 350-horsepower engines. The airplane’s most recent 100-hour inspection was completed on December 12, 2022, at 17,154.5 total aircraft hours, which was 42 hours before the accident. The right engine had accrued 1,662.5 total hours since major overhaul.

Examination of photographs revealed substantial wrinkling of the fuselage and both wings as well as torn flight control surfaces. The right engine cowling was opened and examination revealed cracks in the engine crankcase. The engine was removed and examined at a local aircraft technician's school.

A large crack in the crankcase was visible above the No. 5 cylinder and the crankshaft nose seal was found partially displaced. Oil streaks originated from that point and covered the engine case. Oil streaking was also visible on the right engine cowling at the scene.

Crankshaft rotation attempts were unsuccessful. Borescope examination of the No. 5 cylinder revealed damage consistent with detonation. The remaining cylinders did not appear to have the same extensive damage via the borescope. Attempts to remove the No. 5 cylinder were unsuccessful.

Removal of the No. 3 cylinder showed minor detonation signatures in the combustion chamber and on the piston. The No. 5 cylinder was then removed, and the connecting rod was found broken at the large bearing end. Excessive heat and oil starvation signatures were observed at the connecting rod end. The partially-melted piston was removed from the No. 5 cylinder and a large crater was observed in the combustion chamber from the exhaust valve to the spark plug hole. Attempts to rotate the crankshaft with the two cylinders removed were unsuccessful, likely due oil starvation and heat damage to the crankshaft. The remaining rocker box covers were removed for visual examination with no discrepancies noted.

The spark plugs displayed an "excessively rich mixture" coloration and were sent to Lycoming engines for analysis in their materials lab. The top spark plug from the No. 5 cylinder displayed a "badly damaged" insulator. When asked, the Lycoming engines representative said that detonation events are typically associated with a lean fuel mixture, and the damage displayed was the likely the result of detonation in the No. 5 cylinder.

No source or anomaly that would result in engine detonation was identified.

According to the Pilot's Operating Handbook (POH) for the accident airplane, during a single-engine inoperative approach, the pilot should maintain an airspeed of 116 kts indicated (KIAS) or above until landing is assured. Once landing is assured, the pilot should extend the gear and flaps, slowly retard the power on the operative engine, and land normally. The airplane's best single-engine rate of climb speed (blue line) was 106 KIAS, and its minimum controllable airspeed with one engine inoperative (V<sub>mca</sub>) was 76 KIAS. The maximum speed for full flap extension (40°) was 132 KIAS. The POH also stated that a single-engine go-around should be avoided if at all possible.

## Pilot Information

<b>Certificate:</b>	Airline transport; Flight instructor	<b>Age:</b>	67, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Unknown
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	March 3, 2022
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	June 29, 2022
<b>Flight Time:</b>	9275 hours (Total, all aircraft), 750 hours (Total, this make and model), 8965 hours (Pilot In Command, all aircraft), 155 hours (Last 90 days, all aircraft), 76 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Piper	<b>Registration:</b>	N101MA
<b>Model/Series:</b>	PA-31-350	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1977	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	31-7752186
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	8
<b>Date/Type of Last Inspection:</b>	December 12, 2022 100 hour	<b>Certified Max Gross Wt.:</b>	7448 lbs
<b>Time Since Last Inspection:</b>	42 Hrs	<b>Engines:</b>	2 Reciprocating
<b>Airframe Total Time:</b>	17154 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	Installed	<b>Engine Model/Series:</b>	TIO-540-J2BD
<b>Registered Owner:</b>	PABLO AIR CHARTERS LLC	<b>Rated Power:</b>	350 Horsepower
<b>Operator:</b>	PABLO AIR CHARTERS LLC	<b>Operating Certificate(s) Held:</b>	On-demand air taxi (135)

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	POV,1198 ft msl	<b>Distance from Accident Site:</b>	16 Nautical Miles
<b>Observation Time:</b>	09:15 Local	<b>Direction from Accident Site:</b>	211°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	0.5 miles
<b>Lowest Ceiling:</b>	Overcast / 1000 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	6 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	260°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.97 inches Hg	<b>Temperature/Dew Point:</b>	2°C / 0°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Youngstown, OH (KYNG)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Middlefield, OH	<b>Type of Clearance:</b>	VFR
<b>Departure Time:</b>	08:35 Local	<b>Type of Airspace:</b>	Class E

## Airport Information

<b>Airport:</b>	GEAUGA COUNTY 7G8	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	1174 ft msl	<b>Runway Surface Condition:</b>	Wet
<b>Runway Used:</b>	11	<b>IFR Approach:</b>	RNAV
<b>Runway Length/Width:</b>	3500 ft / 65 ft	<b>VFR Approach/Landing:</b>	Forced landing;None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	5 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	6 None	<b>Latitude, Longitude:</b>	41.449596,-81.062934(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Rayner, Brian
<b>Additional Participating Persons:</b>	Donnie Reed; FAA FSDO; Cleveland, OH Ryan Enders; Lycoming; Williamsport, PA
<b>Original Publish Date:</b>	October 3, 2024
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.ntsb.gov/Docket?ProjectID=106591">https://data.ntsb.gov/Docket?ProjectID=106591</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).