Aviation Investigation Final Report

Location:	Lindenhurst, New York	**Accident Number:**	ERA23FA137
Date & Time:	March 5, 2023, 14:59 Local	**Registration:**	N8149R
Aircraft:	Piper PA-28-161	**Aircraft Damage:**	Destroyed
Defining Event:	Fire/smoke (non-impact)	**Injuries:**	1 Fatal, 2 Serious
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The airplane departed with two passengers on a local “discovery flight.” After completion of the 40-minute flight, while established on a 3-mile final approach for landing, the pilot announced there was smoke in the cockpit and he requested an immediate landing. The pilot subsequently broadcast a “Mayday” over the tower frequency. The tower controller reissued an earlier landing clearance and observed smoke emanating from the left side of the airplane as it descended rapidly from view.

Local doorbell camera and surveillance video captured the airplane in a wings-level attitude, with smooth continuous engine sound until contact with trees and terrain.

Examination of the wreckage identified copper tubing and brass fittings associated with the oil pressure indicating system. These copper oil lines and fittings were on the cockpit side of the firewall and slightly offset toward the left side. The oil pressure tubing exhibited a branch line that was not part of the original design. It is not known exactly where this line was routed behind the instrument panel. At the end of this branch line a brass fitting exhibited melting consistent with very localized heating caused by electrical arcing. The appearance was that of sustained or repeated arcing as it melted through the fitting across multiple flats. The post-crash fire resulted in widespread, diffuse thermal exposure of the wreckage and aircraft components as exhibited by the melted regions of the fitting. If the fitting had reached its melting point due to the postcrash fire, it would have melted entirely without the localized melted region and sharp demarcation shown between melted and intact material.

Two previous reported incidents of smoke in the cockpit of the accident airplane occurred about 2 months and about 50 hours before the accident; however, the investigation could not conclusively determine if those events were related to the event during the accident flight.

It is likely that an intermittent electrical short circuit took place involving the fitting on the end of the oil pressure indicating line. Repeated electrical arcing eventually compromised the fitting enough to allow oil leakage and eventual ignition of the leaking oil, which resulted in an in-flight fire.

Probable Cause and Findings

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

An in-flight fire due to a compromised oil pressure line fitting, which resulted in a collision with terrain during a subsequent emergency landing.

Findings

Aircraft	(general) - Damaged/degraded
Aircraft	Electrical pwr sys wiring - Damaged/degraded

Factual Information

History of Flight

Approach-VFR pattern final	Fire/smoke (non-impact) (Defining event)

On March 5, 2023, at 1459 eastern standard time, a Piper PA-28-161, N8149R, was destroyed when it was involved in an accident in Lindenhurst, New York. The flight instructor and one passenger were seriously injured, and the second passenger was fatally injured. Months after the accident, the flight instructor succumbed to his injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

Statements to law enforcement and the Federal Aviation Administration (FAA) indicated that the accident flight was a "discovery flight," and was a gift from one passenger to her mother, the second passenger.

Flight track information indicated that the airplane departed runway 32 at Republic Airport (FRG), Farmingdale, New York, about 1419. The airplane completed a right turn toward the southeast after departure, crossed the coastline, and proceeded over the Atlantic Ocean. The airplane completed numerous left, right, and 360° turns, and then returned toward FRG. While maneuvering, the airplane's maximum altitude was about 2,000 ft msl.

When the airplane was on an approximate 3-mile final approach to runway 32, the flight instructor reported smoke in the cockpit to the tower controller and requested an immediate landing. The controller instructed the airplane to continue straight-in for the runway. The instructor acknowledged the transmission and advised the controller that he was "turning off" the radios. When on a 2-mile final approach to the runway, the instructor broadcast a "Mayday" transmission and the airplane turned left. The controller reissued the landing clearance and observed smoke emanating from the left side of the airplane as it descended rapidly from view.

Doorbell and surveillance cameras in the vicinity of the accident site recorded the airplane at low altitude and a shallow descent angle as it entered trees, shed sheet metal and major structure, ignited spilled fuel, impacted terrain, and rotated 180°, where it came to rest upright, engulfed in flames. The engine sound was smooth and continuous until ground contact.

Emergency vehicles awaiting the arrival of the airplane at FRG departed the airport property in search of the accident airplane after the impact.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	23,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	August 15, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	330 hours (Total, all aircraft), 121 hours (Total, this make and model)		

The flight instructor's pilot logbook was found in the wreckage, mostly destroyed by fire. Employment and dispatch records revealed that he had accrued an estimated 330.5 total hours of flight experience.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N8149R
Model/Series:	PA-28-161	**Aircraft Category:**	Airplane
Year of Manufacture:	1980	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	28-8016254
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	January 4, 2023 100 hour	**Certified Max Gross Wt.:**	2325 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	18866 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	O-320-D3G
Registered Owner:	On file	**Rated Power:**	160
Operator:	On file	**Operating Certificate(s) Held:**	None

According to FAA and maintenance records, the airplane was manufactured in 1980 and was powered by a Lycoming O-320-D3G, 160-horsepower engine. The airplane's most recent 100-

hour inspection was completed January 4, 2023, at 18,866 total aircraft hours and a tachometer time of 3,655.7 hours. According to the maintenance entry in the logbook, “Replaced #4 cylinder with an overhauled assembly… Yellow tag attached.”

Review of the airplane’s maintenance logbooks revealed an entry dated January 16, 2023, at a tachometer time of 3,657.3 hours, which stated, “Pilot reports smoke in cockpit during flight on 01/07/2023. After troubleshooting, flown and tested. Aircraft returned to service with no smoke.” The most recent entry before the accident was a 50-hour inspection completed on February 27, 2023, at a tachometer time of 3,701.8 hours.

Two flight instructors employed by the operator each reported that they had previously experienced smoke in the cockpit while flying the accident airplane. One of the instructors reported that she experienced smoke in the cockpit during landing approach on a discovery flight on January 2, 2023. After landing, she informed the owner of the flight school, who replied, “we just changed the cylinder, what do you expect?” The instructor stated that no maintenance was performed following this flight and that the airplane was immediately scheduled for another flight.

The other flight instructor and his student reported that they experienced smoke in the cockpit during a flight in the accident airplane on January 7, 2023, while performing touch-and-go takeoffs and landings. The instructor stated that the airplane was taken out of service following this flight. During a subsequent conversation with the owner of the flight school, the owner reported that the smoke was the result of “some type of spray” that the mechanic had used “in the engine,” and that he (the owner) stated that he had flown the airplane, and it was “perfectly good.”

Conversations with the operator, his lead mechanic, and his employees revealed that the company employed no standard operating procedures, safety officer, safety program, formal safety meetings, formal procedures for documenting maintenance discrepancies and their corrective actions and had no emergency response plan. At the time of the accident, the employees had no idea who to contact or how to contact them. They then engaged in discussions among themselves and the operator about who to inform, how to inform them, and when, once they learned of the accident.

According to the operator, “CFIs are independent contractors. Each instructor is a flight school in itself.”

When asked if his airplanes were equipped with fire extinguishers, the operator responded, “As far as I know, all of them have fire extinguishers.” According to his lead mechanic, “Most of the airplanes have them, but I can’t remember which ones.” When asked how the fire extinguishers were mounted, he said, “They weren’t. They were tucked in the seat back pocket.”

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KFRG,75 ft msl	**Distance from Accident Site:**	2 Nautical Miles
Observation Time:	14:53 Local	**Direction from Accident Site:**	318°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 6000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	16 knots / 25 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.05 inches Hg	**Temperature/Dew Point:**	13°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Lindenhurst, NY	**Type of Flight Plan Filed:**	None
Destination:	Lindenhurst, NY	**Type of Clearance:**	VFR
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	Farmingdale Republic FRG	**Runway Surface Type:**	Asphalt
Airport Elevation:	81 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	32	**IFR Approach:**	Unknown
Runway Length/Width:	6833 ft / 150 ft	**VFR Approach/Landing:**	Straight-in

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal, 1 Serious	**Aircraft Fire:**	Both in-flight and on-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 2 Serious	**Latitude, Longitude:**	40.712346,-73.389995(est)

The wreckage was examined at the accident site and all major components were accounted for at the scene. The wreckage path was about 470 ft long and oriented about 300° magnetic. The initial impact point was in a tree about 60 ft above the ground. Sheet metal, a section of

aileron, wingtip fairing, position lights, and angularly-cut branches were scattered along the wreckage path.

About 350 ft down the wreckage path, two trailered boats were destroyed by burning fuel that spilled from the airplane as it passed overhead. The main wreckage came to rest in a right-of-way between a commercial property and a railroad bed. The fence that bordered the property extended approximately parallel to the airplane's flight path and was damaged by impact and fire. The left wing, with main landing gear attached, came to rest about 50 ft before the main wreckage and was damaged by impact and fire. Concave dents in the leading-edge perpendicular to the direction of flight were consistent with the dimensions of fractured tree branches.

The engine cowling rested against a tree trunk abeam the separated left wing. The engine cowling displayed no evidence of pre- or postcrash fire on its inside or outside surfaces. The tree trunk displayed a slash mark consistent with propeller blade contact.

The main wreckage came to rest upright facing approximately opposite the direction of travel. The engine was exposed and was severely damaged by fire. The windscreen, instrument panel, cockpit, cabin area, roof and the empennage were completely consumed by postcrash fire. Seat frames and flight control cables were completely exposed. The right wing was attached, damaged by impact and fire, and displaced 90° aft about mid-span.

Flight control continuity was established from the cockpit flight controls to all flight control surfaces. Continuity to the left wing was established through breaks at the wing root, which displayed signatures consistent with overload failure.

The engine was attached to the airframe and the propeller was attached to the crankshaft. The engine exhibited extensive thermal damage and some impact damage. It was cut from the airframe, removed from the site, and examined. The propeller was removed, and the engine crankshaft was rotated by hand at the propeller flange. Continuity was established through the powertrain to the valvetrain to the accessory section. Compression was confirmed on all cylinders using the thumb method. The right magneto would not rotate; disassembly revealed that it was destroyed by fire. The left magneto's impulse coupling snapped when rotated and produced a visible spark at the points when the cover was removed.

The carburetor was damaged by impact and fire, but the throttle and mixture cables remained attached. The inlet screen was unobstructed, but the floats were melted and destroyed by fire.

The engine-driven fuel pump displayed undamaged diaphragms and pumped fuel when actuated by hand.

After recovery of the wreckage from the site, the examination was continued by an National Transportation Safety Board (NTSB) Fire and Explosion Investigator. His examination revealed that the firewall between the engine compartment and fuselage interior had been exposed to fire and exhibited thermal damage on both sides. Although the firewall panel was composed of

sheet steel and remained intact, it exhibited deformation and thermal discoloration. The thermal damage to the firewall and the attached components was relatively uniform and consistent on both sides. Examination of the fuselage did not reveal any soot streaking or thermal damage on the exterior surfaces that would be consistent with an inflight fire. Examination of the surviving portion of the engine cowing revealed no evidence of soot deposition on the interior or exterior surfaces. Very little material remained from the fuselage and cockpit area of the airplane.

Examination of the firewall and components remaining attached to the engine side of the firewall did not reveal any discernable evidence of concentrated thermal damage beyond the overall thermal exposure exhibited by all the materials in the area.

Examination of the firewall and components remaining attached to the cockpit side of the firewall did not reveal any concentrated thermal damage on the firewall panel but did identify two copper tubes associated with the fuel primer pump and a fitting on a copper tube associated with the oil pressure line that exhibited localized areas of melting. (See Figure 1.) These components exhibited a sharp demarcation between the melted area and the adjacent material. The fuel primer lines were standard equipment consistent with the aircraft design. The fitting on the oil pressure line was not standard equipment and was not consistent with the design of the original oil pressure line. Both the fuel primer lines and the fitting on the oil pressure line were retained for further examination.

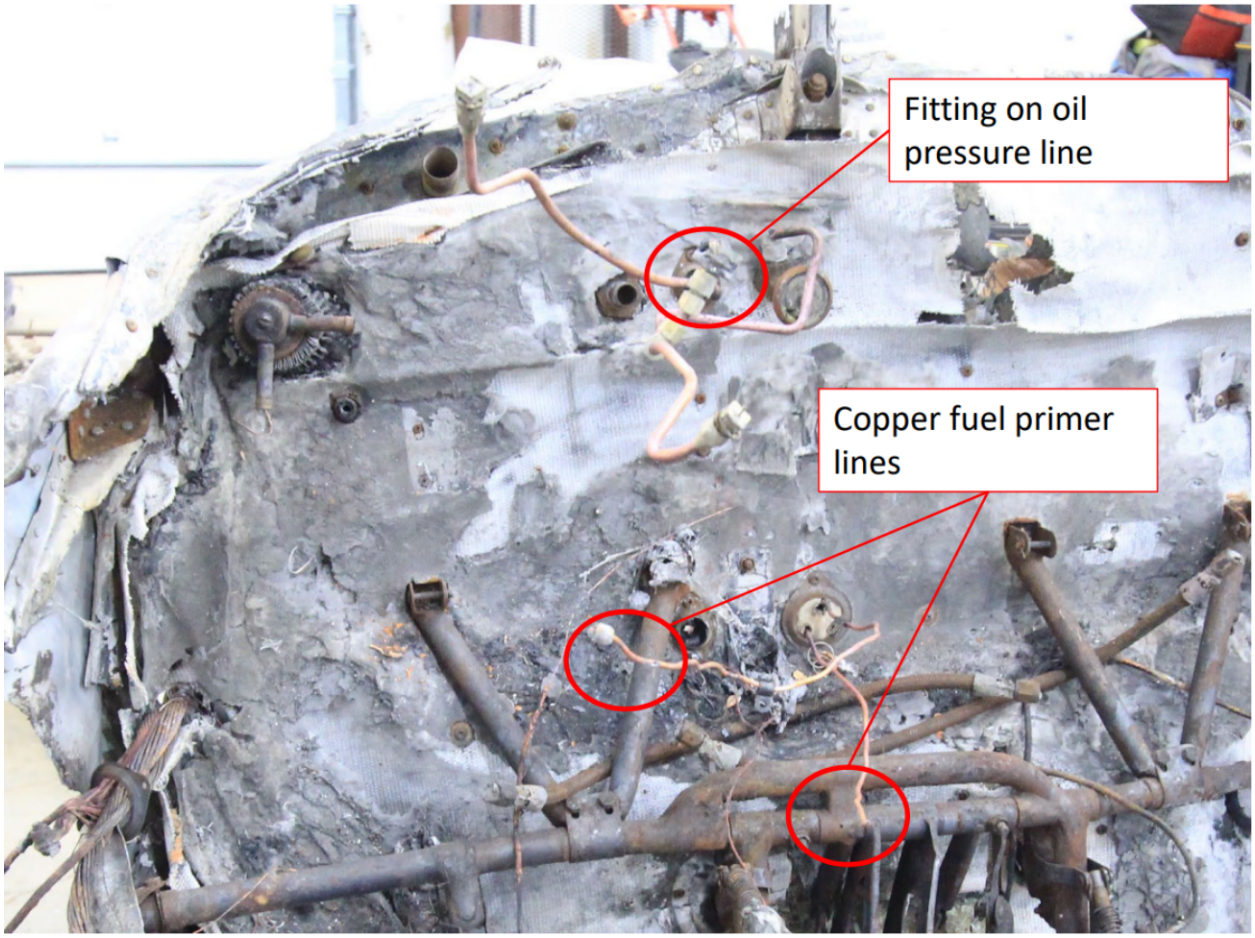

Figure 1. Cockpit side of engine firewall exhibiting overall thermal damage, with localized areas of melting identified.

Additional examination revealed that the fuel primer lines comprised 99.6% copper tubing that measured about 0.125 inches in diameter. The lines could not be positively correlated to the suction and pressure sides of the pump. One of the lines exhibited a melted and tapered end. The other line exhibited areas of varying damage, including areas consistent with melting and re-solidification, as well as an area where the damage had penetrated the tubing through its full thickness. (See Figure 2.)

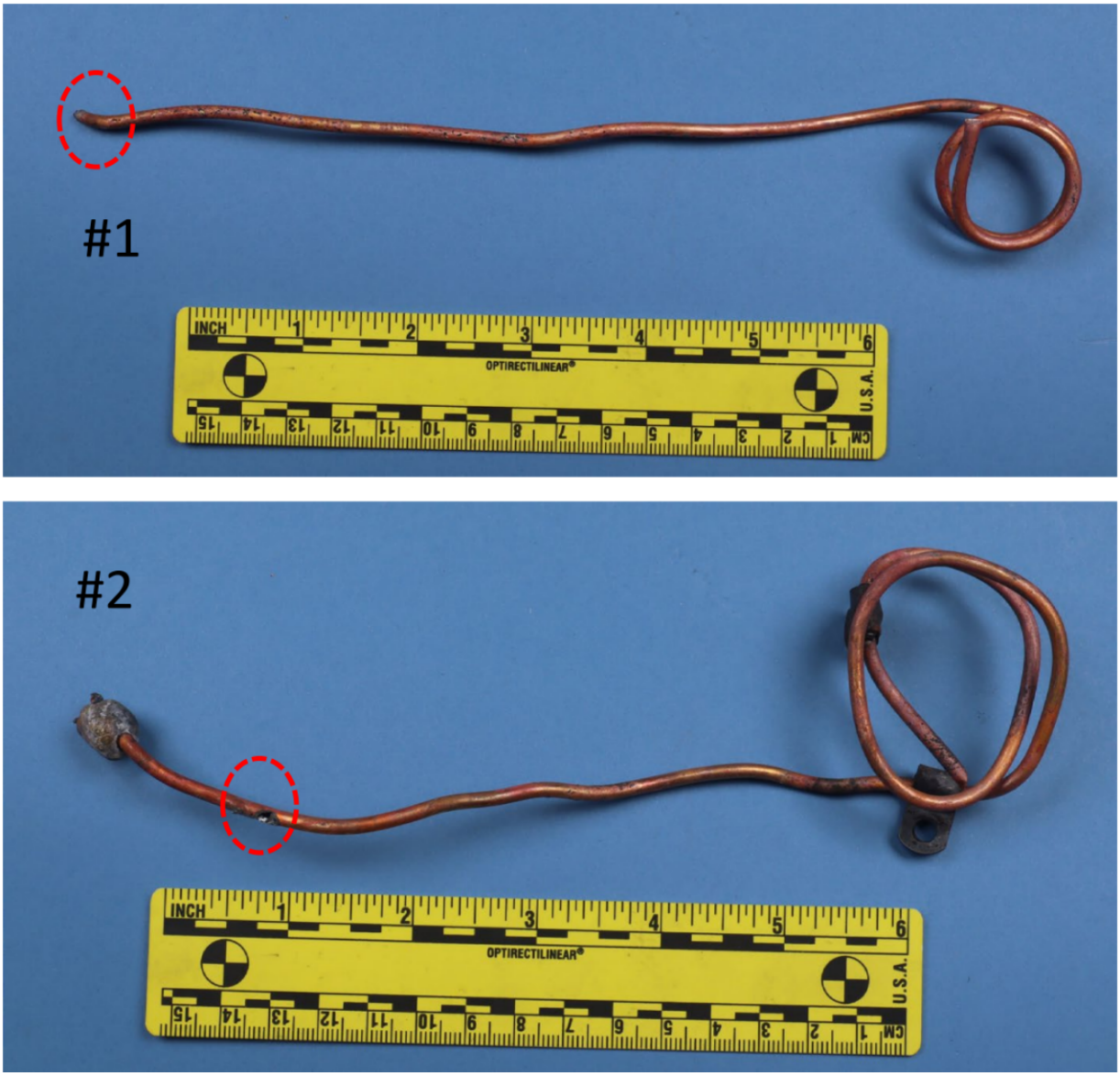

Figure 2. Localized melting of fuel primer lines

The oil pressure line comprised a 0.25-inch copper tube that would have extended from the firewall to an oil pressure gauge on the instrument panel. The oil pressure line was equipped with a tee fitting about midspan along its length.

The tee fitting exhibited a concentrated region of melted and missing material. In some areas, the melted region was flanked by intact material on either side. Some of the margins between the melted and intact material exhibited a scalloped-like appearance. (See Figure 3.) The morphology of the melting exhibited by the fitting was consistent with localized extreme temperature, such as that generated by electrical arcing. The tee fitting, branch line, and melted end fitting were not part of the original oil pressure line design, and what had been connected to the melted fitting was not determined.

Figure 3. Localized melting of oil pressure line tee fitting.

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Marvin Daniels; FAA/FSDO; Farmingdale, NY Ryan Enders; Lycoming; Williamsport, PA Jon Hirsch; Piper; Vero Beach, FL
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