National Transportation Safety Board
Aviation Accident Preliminary Report

Location:	Madeira, OH	**Accident Number:**	ERA19FA124
Date & Time:	03/12/2019, 1516 EDT	**Registration:**	N400JM
Aircraft:	Piper PA31	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Aerial Observation		

On March 12, 2019, at 1516 eastern daylight time, a Piper PA-31-350, N400JM, was substantially damaged when it impacted terrain in Madeira, Ohio. The commercial pilot was fatally injured. The airplane was operated by Marc, Inc. under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a commercial aerial surveying flight. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight that originated from Cincinnati Municipal Airport-Lunken Field (LUK), Cincinnati, Ohio, at 1051.

Review of Federal Aviation Administration (FAA) preliminary air traffic control (ATC) and radar data revealed that the airplane flew several surveying tracks outside of Cincinnati before proceeding north to fly tracks near Dayton. The pilot reported to ATC that he was having a fuel problem and requested "direct" to LUK and a lower altitude. The controller provided the position of Dayton-Wright Brothers Airport (MGY), which was located 8 miles ahead. The pilot reported MGY in sight but requested to continue to LUK. When the pilot checked in with the subsequent ATC facility, he reported that the fuel issue was resolved. Seven miles north of LUK, the pilot established radio contact with the LUK tower controller. He advised the controller that the airplane was experiencing a fuel problem and he did not think it was going to reach the airport. The airplane slowed to a groundspeed of 80 knots before the air traffic controller noted a simultaneous loss of radar and radio contact about 5 nautical miles north of LUK.

A relative of the pilot reported that the pilot told him the airplane "had a fuel leak and it was killing his sinuses" about 1 week prior to the accident. A company employee revealed that the airplane had a fuel leak in the left wing, and that the airplane was due to be exchanged with another company PA-31-350 the week before the accident occurred so that the fuel leak could be isolated and repaired. The accident airplane remained parked for a few days, was not exchanged, and then the accident pilot was brought in to continue flying the airplane.

According to witnesses, the airplane flew "very low" and the engine sputtered before making two loud "pop" or "back-fire" sounds. One witness reported that after sputtering, the airplane "was on its left side flying crooked." Another witness reported that the "unusual banking" made the airplane appear to be flying "like a stunt in an airshow." Two additional witnesses reported that the airplane was flying 100-120 ft above ground level in a southerly direction before it

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turned to the left and "nosedived." Another witness reported that he could see the entire belly of the airplane and the airplane nose was pointing down toward the ground just prior to the airplane impacting a tree. A witness from an adjacent residence reported that there was a "whitish gray smoke coming from the left engine" after the accident, and that a small flame began rising" from that area when he was on the phone with 9-1-1 about 3 minutes after the accident.

According to FAA airmen records, the pilot held a commercial pilot certificate with ratings for airplane single and multi-engine land and instrument airplane. The pilot also held a flight instructor certificate with ratings for airplane single-engine and instrument airplane and a ground instructor certificate. His most recent FAA first-class medical certificate was issued November 8, 2018. Examination of pilot's logbooks revealed 6,392 total hours of flight experience as of February 19, 2019, including 1,364 hours in the accident airplane make and model. His most recent logged flight review was completed January 31, 2017.

According to FAA airworthiness records, the twin-engine airplane was manufactured in 1981. It was powered by two Lycoming, 350-horsepower engines, which drove two 3-bladed, constant-speed, counter-rotating propellers.

Examination of the accident site and wreckage revealed that the airplane impacted a tree and private residence before it came to rest upright on a 335° heading. All major portions of the airplane were located on site.

The fuselage was substantially damaged. The instrument panel was fragmented and destroyed. The engine control levers were fire damaged and all levers were in the full forward position. Control continuity was established from the flight controls to the flight control surfaces except for one elevator cable attachment, which exhibited a tensile overload fracture. The left wing remained attached to the fuselage. The outboard leading edge of the left wing was crushed upward and aft, and the inboard section displayed thermal and impact damage. The right wing outboard of the right nacelle was impact separated, and a section of the right wing came to rest on the roof of the home. The leading edge of the right wing section displayed a semi-circular crush area about 1 ft in diameter. The left horizontal stabilizer and elevator were dented. The right horizontal stabilizer and elevator were bet upward at the tip. Measurement of the rudder trim barrel revealed a nose-right trim setting.

Both engines remained attached to their respective wings. The left engine remained attached at the mount, however the mount was bent and fractured in multiple locations. The engine was angled upward about 75°. All but 4 inches of the left propeller was buried and located at initial ground impact point, which was about 13 ft from the left engine. The right engine was found attached to the right wing and its respective engine mounts, however the engine mounts were fractured in multiple locations. All but 6 inches of the right propeller was buried and located at the initial ground impact point, which was about 18 ft from the right engine.

The left engine crankshaft would not rotate upon initial examination. Impact damage was visible to ignition harness leads on both sides of the engine. Both magnetos remained secured and produced sparks at all leads when tested. Less than 2 ounces of fuel was observed within the fuel inlet of the fuel servo upon removal of the servo. The sample tested negative for water.

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The fuel servo was disassembled and both diaphragms were present and damage free with no signs of tears. The fuel inlet screen was found unobstructed. Rotation of the engine crankshaft was achieved through the vacuum pump drive after the removal of impact damaged pushrods. Spark plugs showed coloration consistent with normal operation and electrodes remained mechanically undamaged. A borescope inspection of all cylinders did not reveal any anomalies. The oil filter was opened, inspected, and no debris was noted. Fuel injectors were removed and unobstructed. Residual or no fuel was found during the examination and removal of components such as fuel lines, injector lines and the fuel pump.

The right engine crankshaft would not rotate upon initial examination. Minor impact damage was visible to ignition harness leads. Cylinder Nos. 2, 4, and 6 displayed varying degrees of impact damage to their top sides. The alternator mount was found fractured and the alternator was not present at the time of engine examination. Spark plugs showed coloration consistent with normal operation and electrodes remained mechanically undamaged. Both magnetos produced sparks at all leads when tested. The fuel servo was dissembled and both diaphragms were present and free of damage with no signs of tears. Engine crankshaft rotation was achieved through the vacuum pump drive after the removal of impact damaged pushrods. A borescope inspection of all cylinders did not reveal any anomalies. The oil filter was opened, inspected and no debris was noted. Fuel injectors were removed and were unobstructed. The oil suction screen was found unobstructed but contained nonferrous pieces of material. Fuel was found during examination of the right engine fuel lines, injector lines, and the fuel pump.

Both propellers were separated from the engine mounting flanges. Examination of the right propeller revealed that all blades exhibited aft bending and bending opposite rotation, twisting leading edge down, and chordwise rotational scoring on both face and camber sides. Examination of the left propeller revealed that two blades exhibited aft bending with no remarkable twist or leading-edge damage. One blade exhibited no remarkable bending or twisting. All three blades exhibited mild chordwise/rotational abrasion.

The wreckage was retained by the NTSB for further examination.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N400JM
Model/Series:	PA31 350	**Aircraft Category:**	Airplane
Amateur Built:	No		
Operator:	MARC, Inc.	**Operating Certificate(s) Held:**	None
Operator Does Business As:	MARC, Inc.	**Operator Designator Code:**	

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Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	LUK, 490 ft msl	**Observation Time:**	1453 EDT
Distance from Accident Site:	5 Nautical Miles	**Temperature/Dew Point:**	9°C / -7°C
Lowest Cloud Condition:	Clear	**Wind Speed/Gusts, Direction:**	3 knots / , 350°
Lowest Ceiling:	None	**Visibility:**	10 Miles
Altimeter Setting:	30.37 inches Hg	**Type of Flight Plan Filed:**	None
Departure Point:	Cincinnati, OH (LUK)	**Destination:**	Cincinnati, OH (LUK)

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.179444, -84.380278

Administrative Information

Investigator In Charge (IIC):	Lynn Spencer
Additional Participating Persons:	Andrew Porter; FAA Cincinnati FSDO; Cincinnati, OH Kathryn Whitaker; Piper Aircraft; Vero Beach, FL Dave Harsanyi; Lycoming Engines; Williamsport, PA Les Doud; Hartzell; Piqua, OH
Note:	The NTSB traveled to the scene of this accident.

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