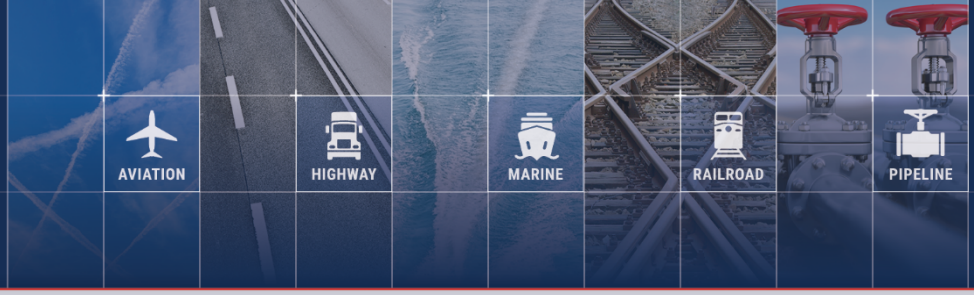


# Aviation Investigation Factual Report

| | | | |
|---|---|---|---|
| **Location:** | FARIBAULT, Minnesota | **Accident Number:** | CHI98FA086 |
| **Date & Time:** | January 26, 1998, 04:00 Local | **Registration:** | N5099W |
| **Aircraft:** | Piper PA-28-160 | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | | **Injuries:** | 2 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Factual Information

HISTORY OF FLIGHT

On January 26, 1998, about 0400 central standard time (cst), a Piper PA-28-160, N5099W, piloted by a private pilot, was destroyed during a collision with the ground following a loss of control in flight. The personal 14 CFR Part 91 flight was not operating on a flight plan. Instrument meteorological conditions prevailed at the time of the accident. The pilot and passenger were fatally injured. The flight departed Brainerd, Minnesota, about 2230 cst.

A witness located in Northfield, Minnesota, about 10-miles north- northeast of the accident site, said he observed a low wing, single-engine airplane fly overhead about 300-feet above the ground about 0230 cst. He said the airplane was heading in a southerly direction and that its engine sounded "...okay." According to this person, the visibility was less than a mile with snow.

According to the Rice County, Minnesota, Sheriff's Department report, the wife of N5099W's passenger said the airplane was supposed to have arrived at the Owatonna Municipal Airport, Owatonna, Minnesota, about 2330 cst. This airport is about 15- miles south of the accident site. The report said the wife waited at the airport until 0100 cst. According to the report, the wife said the weather at the airport was "...foggy and there was a light mist." The report said an off-duty Sheriff's Department Deputy had found the airplane about 0757 cst in a snow-covered field next to a county highway.

PERSONNEL INFORMATION

Federal Aviation Administration (FAA) records showed the pilot obtained his single-engine land airplane private pilot certificate on August 7, 1997, at a total time of 55.5-hours. He possessed an FAA third class medical certificate that was issued on March 6, 1997. According to his logbook, he had 3.0-hours of flight by reference to instruments dual instruction when he obtained his private pilot certificate. The logbook showed he had received 5.8-hours of night dual instruction when he took his private pilot check ride. The logbook showed the pilot had flown 1 additional night flight since obtaining his private pilot's certificate. That flight was flown January 2, 1998, at a total time of 1.1-hours.

AIRCRAFT INFORMATION

The annual inspection on N5099W was completed on November 20, 1997. At that time, the total time on the airframe was 3,004-hours. The last entry into the aircraft logbook showed that new avionics were installed in the airplane on December 15, 1997. The logbook entry for this work did not show any airframe time. Examination of N5099W's engine logbook revealed

that a new exhaust muffler was installed on November 8, 1971. At that time, the airframe had a total time of 1,806-hours. According to the engine logbook, the exhaust system was "...checked..." on June 14, 1978. At that time, the airframe had a total time of 2,469.99-hours. A similar entry, dated November 1, 1982, was found in the logbook. The airplane's total time of 2,635.37-hours at this inspection. The next entry in the logbook that specifically addresses the exhaust system was on September 7, 1995. At that time, the airframe's total time was 3,000.1-hours.

The November 20, 1997, annual inspection entry in the engine logbook did not address an exhaust system inspection. However, a handwritten page that outlined inspection items associated with this inspection showed, "14) Muffler condition" and had the initials "DF" next to the line item. The FAA Principal Maintenance Inspector assigned to this investigation said he had asked the meaning of the initials. He said they represented the person's name who had examined the muffler for its condition. The handwritten page is appended to this report.

## METEOROLOGICAL INFORMATION

According to the recorded weather reports, the weather at the Fairbault Municipal Airport, Fairbault, Minnesota, at 0314 and 0338 cst was 700-feet overcast with a 2-1/2 mile visibility due to ground fog. The temperature/dew point was 24 and 21-degrees Fahrenheit respectively. Reported weather for Mankato and Rochester, Minnesota, airports were similar to Fairbault's reported weather. The weather reports are appended to this report.

## WRECKAGE AND IMPACT INFORMATION

N5099W's first point of impact in a snow-covered farm field was about 470-feet east of Rice County Highway 76. The wreckage trail's general heading was about 295-degrees magnetic. About 25-feet after the first impact mark a second impact point was found. This point had a shape similar to the front view of the fuselage and wings. As the wreckage trail continued, various parts of the airplane were found up to where the airplane's main wreckage was located, about 325-feet from the initial impact point. A wreckage trail sketch is appended to this report.

N5099W's fuselage section forward of the firewall was part of the wreckage trail. The engine and remains of the fuselage were co-located at the end of the wreckage trail. The airplane's fuselage was inverted and resting on the left wings upper surface. Both wings were co-located with the fuselage remains. Sections of the right wing's leading edge were missing back to the main spar. Sections of the left and right wing were found along the wreckage trail.

The empennage was bent forward with the vertical stabilizer's leading edge root area merging into the fuselage's top. About 8-inches of the rudder's outboard tip was bent to the right about 30-degrees. The rudder's trailing edge had a right hand double bend about mid span. The stabilator's left side was crushed and twisted. The right side had small leading edge dents near its tip.

The airplane's flight control system cables were collision damaged. Separated ends of the control cables were broomed. The individual strands of cable at these broomed ends were necked. Control cable continuity was established for the three axis flight control surfaces to the control yoke column and rudder pedals.

The altimeter's Kollsman window was set at 30.11. The pointer needles showed 7,650-feet above mean sea level. The airspeed indicator needle transfer mark was observed at the 132-miles per hour position. Fuel pressure gauge showed 5-pound per square inch. The left fuel tank gauge needle showed empty and the right showed 1/4-fuel supply remaining. The master switch was "ON," the magneto switch was in the "LEFT" position. The fuel pump switch was broken off at the "OFF" position. The carburetor heat was in the "OFF" position.

The engine had separated from the airframe and was next to the fuselage's east side. The propeller and engine crankshaft flange had separated from the engine. The flange separation fractures had shear lips and their surfaces were gray and had a grainy appearance. The propeller spinner was crushed around the propeller hub. One propeller blade was twisted along its full span. A section about 1-inch wide and 3-inches long was missing from the tip. The blade had span and chordwise scratches of various depths and widths along its full span. The second blade was bent aft about 20-degrees and twisted spanwise at the midspan location. Two leading edge gouges, located about 6 and 8-inches in from the tip, were about 1/4 and 1/2-inch deep respectively. This blade had span and chordwise scratching similarly to the other blade. The vacuum pump rotated without noticeable restriction. The vanes and rotor were intact and the drive coupling was not damaged. Examination of the attitude and heading indicator's gyro rotors and cases showed evidence of small rub marks on the rotor's edges and corresponding case locations. The turn and slip indicator's gyro rotor had a scuff mark located about midway on its surface. This mark was about 1/2-inch long. The case had a similar mark whose position closely matched the mark on the rotor.

The engine was examined and found to have mechanical continuity throughout. Thumb compression was observed on cylinders number 1, 3 and 4. Number 2 cylinders thumb compression was not as noticeable as the other three cylinders. Examination of the number 2's cylinder and valves revealed small particles of dirt between the intake valve and valve seat. The spark plug electrodes were a tan/gray color. The electrodes were not debris contaminated. The top and bottom spark plugs for number 1 and 3 cylinders were oil-soaked. Both magnetos produced spark when hand-rotated.

The engine driven fuel pump functioned when its arm was cycled. Upon disassembly about 1-ounce of a blue colored liquid that smelled similar to 100LL AVGAS was observed. The carburetor floats were metal. The floats sides were collapsed inward about 1/16 to 1/8-inch. The soldered joints on the floats were examined and were free of cracks. The floats were immersed into hot water. There were no air bubbles visible while the floats were submerged. The floats were shaken after removal from the water. No liquid was heard inside the floats. The immersion process was repeated except using a paint reducer. The results were the same

as with the water immersion. The carburetor's needle valve hole was clean and not damaged or deformed.

The muffler was crushed against the engine case. Examination of the muffler revealed what appeared to be baked oil residue on the inside surfaces of the muffler shroud. The muffler ends were corroded and pinhole sized holes were noted along the muffler's edge. Rust was observed on both sides of the muffler's main body. Chaffing marks were found on the muffler body and shroud at various locations.

MEDICAL AND PATHOLOGICAL INFORMATION

The autopsies on the pilot and passenger were conducted by the Ramsey County, Minnesota, medical examiner on January 26, 1998. The report showed the pilot had a blood carbon monoxide level of 26.5-percent and the passenger had a blood carbon monoxide level of 13.2-percent. A toxicological examination was conducted on both the pilot and passenger by the Federal Aviation Administration s Civil Aeromedical Institute. The report related to the pilot showed no drugs, cyanide, or ethanol. However, it showed 24-percent carboxyhemoglobin was detected in the blood. The toxicological report on the passenger showed 12-percent carboxyhemoglobin detected in the blood.

TESTS AND RESEARCH

The vehicle the pilot had driven to the departure airport was tested for carbon monoxide levels in the driver's compartment by the Crow Wing County Sheriff's Department on February 12,1998. The department's report stated, "The vehicle was driven for 5-minutes. Levels during the test drive were 0-ppm during the entire test drive." The Department's report is appended to this report.

ADDITIONAL INFORMATION

N5099W's muffler, part number 63688-00, had been produced by Piper Aircraft Company. The muffler had been flown about 1,198-hours between the time it was installed on N5099W and the accident date. Piper Service Letter 324C recommends that N5099Ws exhaust system "...must be rigidly inspected at each 100-hour inspection." Piper Service Letter Number 561 said that "...mufflers with 950 or more hours time in service, inspect within the next 50-hours time in service, and thereafter at intervals not to exceed 50-hours time in service from the last inspection." The purpose of this service letter was to "...inspect the entire muffler system... for possible deterioration." Corresponding logbook entries showing that the service letters advice was complied with were not found.

FAA Airworthiness Directive (AD) AD-62-26-06 applies to the muffler in question. It says that the heat shroud must be removed and all the exhaust piping is to be given a close visual inspection every 50-hours. FAA AD-70-16-05 says that airplanes with this type muffler must have the muffler inspected every 50-hours of operation once the muffler has experienced 950-

hours of service. Corresponding logbook entries showing compliance with the AD's were not observed. The service letters and Airworthiness Directives are appended to this report.

An FAA Principal Operations Inspector conducted interviews with the 2 journeymen-mechanics who had conducted the last annual inspection on N5099W. One mechanic said that the pilot, an apprentice mechanic and he worked on the airplane. He said there were no discrepancies that went uncorrected during the inspection. He was asked how he inspected the muffler system. The mechanic said he removed 5 or 6 screws to loosen the shroud. He said he did not remove the shroud. This mechanic said he used a mirror and flashlight to inspect the entire muffler. He said he did not notice any rust. He said he did notice some very small pin hole sized holes at the end of the muffler, but did not think they were serious or would cause a problem.

The second journeymen mechanic said he conducted a visual inspection of the airframe and engine following a checklist. He said there were no discrepancies noted and he signed off the annual inspection. This mechanic was asked if he had inspected the exhaust system. He said he took off the shroud, inspected the muffler and did not notice anything abnormal. He said he did not notice any cracks, holes or corrosion. The mechanics' interview statements are appended to this report.

A check of the FAA's accident/incident data revealed 15 accidents involving the Piper PA-28 in which an exhaust system muffler had been directly implicated. The FAA's Service Difficulty reporting system showed 15 Piper PA-28 muffler service problems. Of the 15 reports, 6 directly involved deteriorated muffler units that allowed carbon monoxide to leak into the pilot's cockpit area. Copies of these reports are appended to this accident report.

## Pilot Information

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| **Certificate:** | Private | **Age:** | 18,Male |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | None | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 3 Valid Medical--no waivers/lim. | **Last FAA Medical Exam:** | March 6, 1996 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 75 hours (Total, all aircraft), 15 hours (Total, this make and model), 38 hours (Pilot In Command, all aircraft), 15 hours (Last 90 days, all aircraft), 7 hours (Last 30 days, all aircraft) | | |

## Aircraft and Owner/Operator Information

| | | | |
|---|---|---|---|
| **Aircraft Make:** | Piper | **Registration:** | N5099W |
| **Model/Series:** | PA-28-160 PA-28-160 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 28-111 |
| **Landing Gear Type:** | Tricycle | **Seats:** | 4 |
| **Date/Type of Last Inspection:** | November 20, 1997 Annual | **Certified Max Gross Wt.:** | 2050 lbs |
| **Time Since Last Inspection:** | 13 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 3018 Hrs | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Installed, activated, did not aid in locating accident | **Engine Model/Series:** | O-320-B2A |
| **Registered Owner:** | BRAINERD HELICOPTER SERVICE | **Rated Power:** | 160 Horsepower |
| **Operator:** | | **Operating Certificate(s) Held:** | None |
| **Operator Does Business As:** | | **Operator Designator Code:** | |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Instrument (IMC) | **Condition of Light:** | Night/dark |
| **Observation Facility, Elevation:** | FBL ,1020 ft msl | **Distance from Accident Site:** | 4 Nautical Miles |
| **Observation Time:** | 03:38 Local | **Direction from Accident Site:** | 20° |
| **Lowest Cloud Condition:** | Unknown | **Visibility** | 2 miles |
| **Lowest Ceiling:** | Overcast / 700 ft AGL | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 6 knots / None | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 70° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30 inches Hg | **Temperature/Dew Point:** | -4°C / -6°C |
| **Precipitation and Obscuration:** | N/A - None - Fog | | |
| **Departure Point:** | BRAINERD (BRD ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | | **Type of Clearance:** | None |
| **Departure Time:** | 22:30 Local | **Type of Airspace:** | Class G |

## Airport Information

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| **Airport:** | | **Runway Surface Type:** | |
| **Airport Elevation:** | | **Runway Surface Condition:** | |
| **Runway Used:** | 0 | **IFR Approach:** | |
| **Runway Length/Width:** | | **VFR Approach/Landing:** | |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | 1 Fatal | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 2 Fatal | **Latitude, Longitude:** | 44.289268,-93.270217(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Gattolin, Frank |
| **Additional Participating Persons:** | JOHN LYONS; MINNEAPOLIS , MN<br>MARK W PLATT; VAN NUYS , CA<br>KRIS WETHERELL; MONROE , WA |
| **Report Date:** | January 5, 1999 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=10730 |