



# Aviation Investigation Final Report

|                                |                                      |                         |             |
|--------------------------------|--------------------------------------|-------------------------|-------------|
| <b>Location:</b>               | Madison, Connecticut                 | <b>Accident Number:</b> | NYC05FA005  |
| <b>Date &amp; Time:</b>        | October 11, 2004, 17:48 Local        | <b>Registration:</b>    | N233PA      |
| <b>Aircraft:</b>               | Piper PA-28-161                      | <b>Aircraft Damage:</b> | Substantial |
| <b>Defining Event:</b>         |                                      | <b>Injuries:</b>        | 2 Fatal     |
| <b>Flight Conducted Under:</b> | Part 91: General aviation - Personal |                         |             |

## Analysis

The pilot made a "Mayday" call, and reported that he was at 4,000 feet msl and descending without engine power. An approach controller acknowledged the pilot's distress call, and attempted to direct him to a nearby airport. The pilot subsequently elected to perform a forced landing to a field; however, during the landing the airplane impacted a private residence. A witness, located about 4 miles north of the accident site, saw the accident airplane flying normally, then heard a "bang." He then heard about 5 seconds of intermittent engine noise, followed by white smoke, which began trailing behind the airplane as it flew. The propeller was found about 3.4 miles from where the airplane came to rest. Examination of the airframe revealed no mechanical anomalies, and examination of the engine revealed damage consistent with an engine overspeed. Examination of the propeller, propeller flange, and associated hardware revealed signatures consistent with insufficient propeller retention bolt torque.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of engine power due to separation of the propeller due to under-torqued retention bolts.

## Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF  
Phase of Operation: CRUISE

Findings

1. (C) PROPELLER SYSTEM/ACCESSORIES,PROP BLADE RETENTION - UNDERTORQUED
2. PROPELLER SYSTEM/DRIVE ASSEMBLY - SEPARATION

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Occurrence #2: FORCED LANDING

Phase of Operation: EMERGENCY DESCENT/LANDING

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Occurrence #3: IN FLIGHT COLLISION WITH OBJECT

Phase of Operation: EMERGENCY DESCENT/LANDING

Findings

3. OBJECT - RESIDENCE

## Factual Information

### HISTORY OF FLIGHT

On October 11, 2004, about 1748 eastern daylight time, a Piper PA-28-161, N233PA, was substantially damaged when it impacted a private residence in Madison, Connecticut, while attempting to execute a forced landing. The certificated private pilot and passenger were fatally injured. Visual meteorological conditions prevailed for the personal flight that departed Nantucket Memorial Airport (ACK), Nantucket, Massachusetts, destined for Danbury Municipal Airport (DXR), Danbury, Connecticut. No flight plan was filed for the flight, which was conducted under 14 CFR Part 91.

According to air traffic control communication tapes, the pilot made a "Mayday" call on 121.5 megahertz. The pilot then reported he was at 4,000 feet msl, and descending without engine power. Bradley Approach Control acknowledged the pilot's distress call, and instructed him to "squawk 7700." Another pilot transmitted a suggestion to switch fuel tanks, and to turn the electric boost pump on. The accident pilot replied he had switched to the right fuel tank, and that the boost pump was on, but there was oil on the windscreen. The controller then provided radar vectors toward a small airport, approximately 4 nautical miles to the southeast. When the airplane was approximately 2 miles from the airport, and at 1,600 feet msl, the pilot reported seeing a field to his left. The controller asked the pilot if he thought he could make the airport. The pilot paused, and then said he was going for the field, which was also his final recorded transmission.

A witness, located about 4 miles north of the accident site, stated that he saw the accident airplane flying normally, then heard a "bang." He then heard about 5 seconds of intermittent engine noise, followed by white smoke, which began trailing behind the airplane as it flew southwest.

Another witness, who was standing about 30 feet from the accident site, stated that the airplane came through the trees, and impacted her house. The witness added she did not hear the engine running, and that the sound of the airplane in the trees was what initially caught her attention.

The accident occurred during the hours of daylight. The wreckage was located at 41 degrees, 17.080 minutes north latitude, 72 degrees, 35.080 minutes west longitude, and an elevation of approximately 45 feet msl.

### PERSONNEL INFORMATION

The pilot held a private pilot certificate with a rating for airplane single engine land. On his

most recent application for a Federal Aviation Administration (FAA) third-class medical certificate, dated July 13, 2003, he reported 20 total hours of flight experience. According to the pilot's logbook, at the time of the accident he had accumulated 96.8 total hours of flight experience, 76.6 hours of which were in the accident airplane make and model.

## AIRCRAFT INFORMATION

According to maintenance records, the engine was overhauled on May 1, 2004, and then reinstalled on June 2, 2004. On August 27, 2004, a 100-hour inspection was completed. On October 5, 2004, the propeller was removed in an effort to troubleshoot a low engine rpm issue, no anomalies were identified with the propeller, and it was reinstalled. Holes were then identified in the mufflers, and the necessary repairs were made. The low rpm issue was resolved, and the airplane was returned to service. At the time of the accident, the airplane accumulated 17.4 hours of operation since being returned to service, 160 hours since the most recent engine overhaul, and 11,756 total hours of operation.

## METEOROLOGICAL INFORMATION

A weather observation taken about 5 minutes after the accident at the Tweed-New Haven Airport, about 13 miles west of the accident site, recorded the wind as 340 degrees at 12 knots, visibility 10 statute miles, ceiling 4,800 feet broken, temperature 57 degrees Fahrenheit, dew point 39 degrees Fahrenheit, and an altimeter setting of 29.95 inches of mercury.

## WRECKAGE AND IMPACT INFORMATION

The start of the debris path was marked by freshly broken branches near the top of an approximately 70-foot tall tree. The debris path was approximately 130 feet long, orientated on a 240-degree magnetic heading, and terminated at the main wreckage, which was located on the first floor roof of a two-story house. The main wreckage came to rest on a magnetic heading of 270 degrees, and was comprised of all the major airplane components, except for the propeller, which was later located several miles north of the accident site.

Examination of the main wreckage revealed the airplane had partially penetrated the roof and ceiling of the house, and inside the house was a pronounced odor consistent with 100LL aviation fuel. The windscreen and vertical stabilizer were covered with a lubricant, consistent with engine oil. The left wing had separated from the airframe, and the empennage and right wing were attached. Flight control continuity was confirmed from the ailerons, vertical stabilizer, and rudder to the floor of the cockpit, but not to the control yokes due to impact damage. Elevator trim was approximately 2 degrees nose down, and the flaps were fully extended.

Examination of the cockpit revealed the shoulder harnesses were connected to the buckle, and the belt straps had been cut. The floor tracks were intact, and both seats were attached. The engine oil pressure gauge indicated zero, the engine oil temperature gauge indicated zero, and

the tachometer indicated 375 RPM, and 295.2 hours. The throttle was in the "IDLE" position, the mixture control was in the "RICH" position, and the engine primer plunger was in and locked.

Examination of the fuel system revealed that the left wing tank contained approximately 5 gallons of fuel, and the right tank contained less than 1 gallon. The fuel selector was set to the right tank, and when removed from the airframe, fuel drained from all three fuel lines. The electrical master and boost pump switches were placed in the "ON" position, and the electric fuel pump produced suction. The engine driven fuel pump was removed from the engine accessory section, a force was applied to the pump arm, and the pump produced suction. The fuel lines from both fuel tanks to the carburetor displayed multiple breaks, and continuity could not be confirmed. Continuity of the engine control cables from the cockpit to the carburetor was confirmed. The carburetor fuel screen was absent of debris.

Examination of the ignition system revealed the ignition switch was "OFF," and the key had been removed. Continuity between the ignition switch and the magnetos could not be confirmed because of impact damage. Continuity from the magnetos to all eight sparkplugs could also not be confirmed due to impact damage. The magnetos were removed from the engine accessory section, a rotational force was applied to the input drives, and spark was observed on all the magneto towers.

Examination of the engine oil system revealed approximately 1 quart of oil in the oil reservoir, and no contaminants were identified in the reservoir, oil filter, or oil suction screen. Continuity of the engine oil lines could not be confirmed because of impact damage.

Examination of the engine revealed that the propeller had separated from the propeller flange in-flight, and five of the six propeller bolt shanks remained in the flange. The engine case was compromised at the crankshaft nose seal, and the nose seal was broken. Continuity of the induction and exhaust systems could not be confirmed because of impact damage. All four top sparkplugs were removed, and the electrodes were gray in color. A rotational force was applied to the crankshaft, and the crankshaft, camshaft, and accessory gears all rotated, but compression was not obtained. The engine was then disassembled, and damage consistent with an engine overspeed was identified for all four valve assemblies.

The propeller, along with four propeller bolt halves, were located on October 13, 2004, 3.4 miles north of the main wreckage. The propeller and bolt halves were transported to the main wreckage by local authorities for examination. The No. 1 blade tip displayed trailing edge impact damage, and random scratches. The No. 2 blade also displayed random scratches. Three of the four propeller bolt halves recovered with the propeller were still in the propeller hub, and had remnants of safety wire in the bolt heads. The fourth bolt half was located between the initial ground scar, and where the propeller came to rest. The propeller spinner and spinner bulkheads were not located.

The propeller, propeller hub, associated bolts, and safety wire were forwarded to the Safety

Board Metallurgy Laboratory for further examination.

## MEDICAL AND PATHOLOGICAL INFORMATION

Toxicological testing was performed on the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma.

## TESTS AND RESEARCH

The Sensenich 74DM6-0-60 propeller was attached to the propeller-mounting flange by six AN76-42S bolts, and AN960-616 washers, which were supplied by the propeller manufacturer. Maintenance instructions specified that the bolts were to be tightened to between 280 and 300 inch-pounds, and then safety-wired with -41 safety wire.

Examination of the propeller, propeller flange, and the associated hardware revealed that preexisting fatigue cracking existed in five of the six propeller retention bolts, and had progressed through between 20 and 95 percent of the bolt cross-sections before separation by overstress. Additionally, five of the six nuts also exhibited fatigue cracking through between 25 and 100 percent of the nut cross-section before separation by overstress. Portions of the recovered pieces of safety wire showed evidence of fatigue cracking through 90 percent of the cross-sections. Evidence existed that the bolts had begun to back out of their respective ferrules due to operational vibration. Fretting damage was also present on the forward face of the propeller flange, and the aft face of the propeller hub.

The torque-wrench used by the mechanic to install the propeller following the airplane's most recent maintenance was examined. The wrench was accurately calibrated, and in working order.

The majority of the main wreckage was released to the owner's representative on October 14, 2004. The propeller, along with the retained propeller assembly components were released on January 25, 2006.

## Pilot Information

|                                  |   |  |                  |
|----------------------------------|---|--|------------------|
| <b>Certificate:</b>              | Private   | <b>Age:</b>                              | 44, Male         |
| <b>Airplane Rating(s):</b>       | Single-engine land  | <b>Seat Occupied:</b>                    | Left             |
| <b>Other Aircraft Rating(s):</b> | None  | <b>Restraint Used:</b>                   |                  |
| <b>Instrument Rating(s):</b>     | None  | <b>Second Pilot Present:</b>             | No               |
| <b>Instructor Rating(s):</b>     | None  | <b>Toxicology Performed:</b>             | Yes              |
| <b>Medical Certification:</b>    | Class 3 Without waivers/limitations                                   | <b>Last FAA Medical Exam:</b>            | July 1, 2003     |
| <b>Occupational Pilot:</b>       | UNK   | <b>Last Flight Review or Equivalent:</b> | February 1, 2004 |
| <b>Flight Time:</b>              | 96 hours (Total, all aircraft), 76 hours (Total, this make and model) |  |                  |

## Aircraft and Owner/Operator Information

|                                      |                                 |                                       |                 |
|--------------------------------------|---------------------------------|---------------------------------------|-----------------|
| <b>Aircraft Make:</b>                | Piper                           | <b>Registration:</b>                  | N233PA          |
| <b>Model/Series:</b>                 | PA-28-161                       | <b>Aircraft Category:</b>             | Airplane        |
| <b>Year of Manufacture:</b>          |                                 | <b>Amateur Built:</b>                 |                 |
| <b>Airworthiness Certificate:</b>    | Normal                          | <b>Serial Number:</b>                 | 28-7816676      |
| <b>Landing Gear Type:</b>            | Tricycle                        | <b>Seats:</b>                         | 4               |
| <b>Date/Type of Last Inspection:</b> | August 1, 2004 100 hour         | <b>Certified Max Gross Wt.:</b>       | 2440 lbs        |
| <b>Time Since Last Inspection:</b>   | 50 Hrs                          | <b>Engines:</b>                       | 1 Reciprocating |
| <b>Airframe Total Time:</b>          | 11703 Hrs as of last inspection | <b>Engine Manufacturer:</b>           | Lycoming        |
| <b>ELT:</b>                          | Installed, not activated        | <b>Engine Model/Series:</b>           | O-320           |
| <b>Registered Owner:</b>             | SUNSHINE EQUITY TRUST           | <b>Rated Power:</b>                   | 160 Horsepower  |
| <b>Operator:</b>                     | Danbury Flight School           | <b>Operating Certificate(s) Held:</b> | None            |

## Meteorological Information and Flight Plan

|   |                                  |   |                   |
|---|----------------------------------|---|-------------------|
| <b>Conditions at Accident Site:</b>     | Visual (VMC)                     | <b>Condition of Light:</b>                  | Day               |
| <b>Observation Facility, Elevation:</b> | HVN,14 ft msl                    | <b>Distance from Accident Site:</b>         | 13 Nautical Miles |
| <b>Observation Time:</b>                | 17:53 Local                      | <b>Direction from Accident Site:</b>        | 280°              |
| <b>Lowest Cloud Condition:</b>          |                                  | <b>Visibility</b>                           | 10 miles          |
| <b>Lowest Ceiling:</b>                  | Broken / 4800 ft AGL             | <b>Visibility (RVR):</b>                    |                   |
| <b>Wind Speed/Gusts:</b>                | 12 knots / None                  | <b>Turbulence Type Forecast/Actual:</b>     | /                 |
| <b>Wind Direction:</b>                  | 340°                             | <b>Turbulence Severity Forecast/Actual:</b> | /                 |
| <b>Altimeter Setting:</b>               | 29.95 inches Hg                  | <b>Temperature/Dew Point:</b>               | 14°C / 4°C        |
| <b>Precipitation and Obscuration:</b>   | No Obscuration; No Precipitation |   |                   |
| <b>Departure Point:</b>                 | NANTUCKET, MA (ACK )             | <b>Type of Flight Plan Filed:</b>           | None              |
| <b>Destination:</b>                     | DANBURY, CT (DXR )               | <b>Type of Clearance:</b>                   | None              |
| <b>Departure Time:</b>                  | 16:38 Local                      | <b>Type of Airspace:</b>                    |                   |

## Wreckage and Impact Information

|                            |         |                             |                      |
|----------------------------|---------|-----------------------------|----------------------|
| <b>Crew Injuries:</b>      | 1 Fatal | <b>Aircraft Damage:</b>     | Substantial          |
| <b>Passenger Injuries:</b> | 1 Fatal | <b>Aircraft Fire:</b>       | None                 |
| <b>Ground Injuries:</b>    | N/A     | <b>Aircraft Explosion:</b>  | None                 |
| <b>Total Injuries:</b>     | 2 Fatal | <b>Latitude, Longitude:</b> | 41.284721,-72.584724 |



## Administrative Information

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| <b>Investigator In Charge (IIC):</b>     | Muzio, David   |
| <b>Additional Participating Persons:</b> | Steven I Racicot; FAA/FSDO; Windsor Locks, CT<br>George M Hollingsworth; New Piper; Vero Beach, FL<br>James M Childers; Textron Lycoming; Williamsport, PA |
| <b>Original Publish Date:</b>            | May 30, 2006   |
| <b>Last Revision Date:</b>               |  |
| <b>Investigation Class:</b>              | <a href="#">Class</a>  |
| <b>Note:</b>                             | The NTSB traveled to the scene of this accident.   |
| <b>Investigation Docket:</b>             | <a href="https://data.nts.gov/Docket?ProjectID=60306">https://data.nts.gov/Docket?ProjectID=60306</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](#).