# Aviation Investigation Final Report

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| **Location:** | Ruston, Louisiana | **Accident Number:** | FTW03LA102 |
| **Date & Time:** | March 2, 2003, 12:00 Local | **Registration:** | N383MA |
| **Aircraft:** | Enstrom 280FX | **Aircraft Damage:** | Substantial |
| **Defining Event:** | | **Injuries:** | 1 None |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The 43-hour student helicopter pilot landed stated that he hovered the helicopter from the parking area to the taxiway for a west departure. After taxiing "at about a 2-3 foot skid height for about 100 yards, he settled the helicopter back down on the ground against a headwind, landing very, very gently." The pilot stated he started to "throttle down" the engine. At approximately 1/3 power, he heard a loud "splat," after which the helicopter "quivered." After shutting down the engine, the pilot exited the helicopter and noticed that the tail rotor was not turning. The 1986-model helicopter was reported to have accumulated a total of 1,609 hours since new. The investigation revealed that the tail cone separated and the associated bolt had fractured due to fatigue failure.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The separation of the upper tail cone as a result of a fractured bolt due to fatigue.

### Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: STANDING - ENGINE(S) OPERATING

Findings
1. (C) MISC ROTORCRAFT,TAIL CONE - SEPARATION
2. (F) MISCELLANEOUS,BOLT/NUT/FASTENER/CLAMP/SPRING - FRACTURED

## Factual Information

On March 2, 2003, approximately 1200 central standard time, an Enstrom 280FX helicopter, N383MA, was substantially damaged when the tail boom separated while on the ground prior to takeoff at the Ruston Regional Airport (RNS) near Ruston, Louisiana. The helicopter was registered to and operated by the pilot. The private pilot, sole occupant, was not injured. Visual meteorological conditions prevailed, and a flight plan was not filed for the 14 Code of Federal Regulations Part 91 instructional solo flight. The cross-country flight was originating at the time of the accident and was destined for the Monroe Regional Airport, near Monroe, Louisiana.

The 43-hour student helicopter pilot reported in the Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2) that he hovered the helicopter from the parking area to the taxiway for a west departure. After taxiing "at about a 2-3 foot skid height for about 100 yards, he settled the helicopter back down on the ground against a headwind, landing very, very gently." The pilot stated he started to "throttle down" the engine. At approximately 1/3 power, he heard a loud "splat," after which the helicopter "quivered." After shutting down the engine, the pilot exited the helicopter and noticed that the tail rotor was not turning.

According to a witness who was outside the fixed base operator, the pilot started taxiing to the middle of the ramp at approximately 2-3 feet above the ground. When the helicopter reached the middle of the ramp, the pilot started to set the helicopter on the ground. When the pilot got the helicopter on the ground, he started backing off the power. The witness then heard a loud noise.

Another witness, standing approximately 1,500 feet away from the accident site, observed the helicopter taxiing from a hangar area toward the runway. The helicopter "appeared to be well controlled and handled by a qualified pilot." Before reaching the taxiway, the helicopter landed, and the witness heard a loud noise, "possibly a backfire." Both the main rotors and the tail rotor began slowing down. The tail rotor came to a stop while the main rotors continued to decelerate.

The pilot noted that the tail was bent down and a bolt that holds the tail was broken in half. The pilot also noted that the tail rotor drive was bent and detached from the tail rotor, and the counter rotation cable control on the right side was broken.

Examination of the helicopter tail boom by the FAA Inspector, who responded to the site, revealed that the upper tail cone bolt was fractured. Further examination of the tail boom revealed that the tail rotor drive shaft flex coupling was separated, the tail rotor drive shaft was bent, and the tail rotor control cable was separated.

On November 28, 2003, an examination of the upper tail cone bolt at the National Transportation Safety Board Materials Laboratory revealed that the head of the bolt was rusted in most areas including inside the hexagon hole. The bolt itself was fractured at approximately the 5th thread from the shank and the mating section was missing.

Examination of the upper tail cone bolt also revealed that the washer contained a 45 degree chamfer on one side to cover the large head radius with the shank. The washer contact face with the bolt head showed circumferential scoring marks.

The bolt fracture surface was flat, on a plane perpendicular to the bolt axis, and contained arrest marks indicative of fatigue cracking over much of its area. The fatigue region initiated at the outer diameter surface of the bolt at a thread root and propagated across approximately 85 percent of the cross-sectional area prior to transitioning to tensile overstress.

The 1986-model helicopter was reported to have accumulated a total of 1,609 hours since new.

## Pilot Information

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| **Certificate:** | Private; Student | **Age:** | 48,Male |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | Helicopter | **Restraint Used:** | |
| **Instrument Rating(s):** | None | **Second Pilot Present:** | |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 3 Valid Medical--w/ waivers/lim | **Last FAA Medical Exam:** | August 14, 2002 |
| **Occupational Pilot:** | UNK | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 123 hours (Total, all aircraft), 43 hours (Total, this make and model), 53 hours (Pilot In Command, all aircraft), 5 hours (Last 90 days, all aircraft), 1 hours (Last 30 days, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Enstrom | **Registration:** | N383MA |
| **Model/Series:** | 280FX | **Aircraft Category:** | Helicopter |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Utility | **Serial Number:** | 2018 |
| **Landing Gear Type:** | Skid | **Seats:** | 4 |
| **Date/Type of Last Inspection:** | September 1, 2002 Annual | **Certified Max Gross Wt.:** | 2100 lbs |
| **Time Since Last Inspection:** | 9 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 1609 Hrs at time of accident | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Not installed | **Engine Model/Series:** | HIO-360-F1AD |
| **Registered Owner:** | Herbert F. Vandenberg | **Rated Power:** | 225 Horsepower |
| **Operator:** | | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | | **Distance from Accident Site:** | |
| **Observation Time:** | | **Direction from Accident Site:** | |
| **Lowest Cloud Condition:** | 3400 ft AGL | **Visibility** | 10 miles |
| **Lowest Ceiling:** | Broken / 3400 ft AGL | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 6 knots / None | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 340° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.15 inches Hg | **Temperature/Dew Point:** | 11°C / 4°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Ruston (RSN ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Monroe, LA (MLU ) | **Type of Clearance:** | None |
| **Departure Time:** | 11:00 Local | **Type of Airspace:** | Unknown |

## Airport Information

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| **Airport:** | Ruston Municipal Airport RSN | **Runway Surface Type:** | |
| **Airport Elevation:** | 360 ft msl | **Runway Surface Condition:** | Unknown |
| **Runway Used:** | | **IFR Approach:** | None |
| **Runway Length/Width:** | | **VFR Approach/Landing:** | None |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 None | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 None | **Latitude, Longitude:** | 32.514446,-92.588333 |

## Administrative Information

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| **Investigator In Charge (IIC):** | Wigington, Douglas |
| **Additional Participating Persons:** | Tim D Wells; FAA Flight Standards District Office; Baton Rouge, LA |
| **Original Publish Date:** | June 2, 2004 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=56564 |