Aviation Investigation Final Report

Location:	Arvilla, North Dakota	**Accident Number:**	CEN09LA565
Date & Time:	September 6, 2009, 08:05 Local	**Registration:**	N204JB
Aircraft:	Bell UH-1B	**Aircraft Damage:**	Substantial
Defining Event:	Aircraft structural failure	**Injuries:**	1 Serious
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The helicopter pilot reported that he heard a “crack” and a “bang” when he pulled up at the end of the field during the spray run. He stated the helicopter began spinning to the right as it gained altitude. He rolled off the throttle and was able to clear a row of trees at the end of the field. The helicopter impacted the terrain on one side of the tree line and the tail boom was located approximately 100 feet away, on the other side of the tree line. The examination revealed the tail boom’s upper left attach fitting contained fatigue fractures that originated at the upper and lower rivet holes. Corrosion was also present along the fractured surface. The tail boom’s upper right attachment bolt contained a fatigue fracture which had multiple origins. The tail boom’s lower right attach fitting fractured as a result of overload. The tail boom involved in this accident was installed on the helicopter on February 20, 2006, and had been removed from a UH-1F helicopter. The UH-1F tail boom is 23.8 inches longer than the UH-1B tail boom that was originally on the helicopter. The pilot/owner, who is an airframe and powerplant mechanic with inspection authority, performed this maintenance. There is no load data nor is there a Supplemental Type Certificate available for this installation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The aircraft owner/mechanic/pilot's installation of an improper tail boom assembly and the resulting fatigue failure of the tail boom's attach fittings.

Findings

Aircraft	Rotorcraft tail boom - Fatigue/wear/corrosion
Personnel issues	Installation - Maintenance personnel
Aircraft	Rotorcraft tail boom - Incorrect service/maintenance

Factual Information

History of Flight

Maneuvering	Aircraft structural failure (Defining event)
Maneuvering	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On September 6, 2009, at 0805 central daylight time, a Bell UH-1B, N204JB, experienced a tail boom separation during an aerial application flight in Arvilla, North Dakota. The pilot received serious injuries. The helicopter received substantial damage to the fuselage and tail boom. The flight was being operated under Title 14 Code of Federal Regulations Part 137. Visual meteorological conditions prevailed and no flight plan was filed. The local flight originated from the Morten Airport (62ND), Larimore, North Dakota, shortly before the accident.

The pilot reported that he heard a “crack” and a “bang” when he pulled up at the end of the field during the spray run. He stated the helicopter began spinning to the right as it gained altitude. He rolled off the throttle and was able to clear a row of trees at the end of the field. The helicopter impacted the terrain on one side of the tree line, and the tail boom was located approximately 100 feet away on the other side of the tree line. A piece of the aft fuselage bulkhead was located approximately 100 feet from the tail boom.

Examination of the tail boom revealed the upper left attach point fitting was separated from the tail boom. The bolt along with the forward portion of the fitting remained attached to the fuselage. The bolt from the lower left attach point fitting was missing. The bolt hole was slightly elongated and the bulkhead was slightly buckled. Half of the upper right attach point bolt was missing. The lower right attach fitting was in place and a portion of the fuselage bulkhead was separated from the fuselage bulkhead and remained with the fitting.

Pieces of the tail boom’s upper left attach fitting, the upper right attach bolt, and a portion of the lower right attach fitting and bolt were removed from the helicopter. These components were examined at the Bell Helicopter laboratory under the supervision of the Safety Board. The examination revealed the tail boom’s upper left attach fitting contained fatigue fractures that originated at the upper and lower rivet holes. Corrosion was also present along the fractured surface. The tail boom’s upper right attachment bolt contained a fatigue fracture which had multiple origins. The tail boom’s lower right attach fitting fractured as a result of overload.

According to the helicopter operator and maintenance records, the tail boom involved in this accident was installed on the helicopter on February 20, 2006. This tail boom, serial number BBBF-0002, part number 204-200-022-3A, had been removed from a Bell UH-1F. The UH-1F tail boom is 23.8 inches longer than the UH-1B tail boom that was originally on the helicopter. Longer main rotor blades were also installed on the helicopter at the same time. The

pilot/owner, who is an airframe and powerplant mechanic with inspection authority, performed his own maintenance. According to Bell Helicopter, there is no load data available for UH-1B helicopters with a UH-1F tail boom installation, nor is there an Supplemental Type Certificate available for this installation.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	49,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	April 7, 2009
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 10, 2008
Flight Time:	14000 hours (Total, all aircraft), 1000 hours (Total, this make and model), 13900 hours (Pilot In Command, all aircraft), 120 hours (Last 90 days, all aircraft), 0 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N204JB
Model/Series:	UH-1B	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	63-13088
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	February 6, 2009 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	17 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	9587 Hrs	**Engine Manufacturer:**	LYCOMING
ELT:	Installed, not activated	**Engine Model/Series:**	T-53L13BA
Registered Owner:	MORTEN JESSE L	**Rated Power:**	1400 Horsepower
Operator:	MORTEN JESSE L	**Operating Certificate(s) Held:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	GFK,845 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	07:55 Local	**Direction from Accident Site:**	45°
Lowest Cloud Condition:	Clear	**Visibility**	7 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.05 inches Hg	**Temperature/Dew Point:**	16°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Larimore, ND (62ND)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class E

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	47.917778,-97.494445(est)

Administrative Information

Investigator In Charge (IIC):	Sullivan, Pamela
Additional Participating Persons:	Vance Emerson; FAA-FAR-FSDO; Fargo, ND Keith Burke; FAA-FAR-FSDO; Fargo, ND David Dosker; Bell Helicopter; Fort Worth, TX
Original Publish Date:	April 22, 2010
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=74668