



# National Transportation Safety Board Aviation Accident Data Summary

<b>Location:</b>	San Antonio, TX	<b>Accident Number:</b>	CEN16LA027
<b>Date &amp; Time:</b>	11/02/2015, 1923 CST	<b>Registration:</b>	N496AE
<b>Aircraft:</b>	BELL 407	<b>Injuries:</b>	3 None
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Non-scheduled - Air Medical (Discretionary)		

## Analysis

The commercial pilot was conducting an emergency medical services flight. The pilot reported that, when he climbed the helicopter to a 3-ft hover, he heard a loud bang, and the helicopter began an uncommanded right yaw. The pilot applied full left pedal, but this did not arrest the yaw. The pilot then lowered the collective, and the helicopter touched down and then rotated 270 degrees to the right before it came to a stop.

The tail rotor was examined, and it could be manually rotated, but a grinding noise could be heard coming from the damaged No. 3 hanger bearing. The main rotor blades did not rotate in synchronization with the tail rotor blades. The No. 3 tail rotor shaft adapter and shaft splines were completely ground down, the adapter and shaft had failed, and there was evidence of excessive torsion beyond the intended allowable tolerances. The aluminum adapter washer hole was elongated, consistent with a loose through bolt, and the drive shaft through bolt had worn threads. There was a 1/8-inch gap between the adapter and the base of the hanger bearing, consistent with the adapter not being fully in contact with the bearing and potential stress within the adapter and shaft splines. The retaining nut had migrated almost .025 inch outward and was very loose, consistent with the loss of torque, which would have allowed movement between the tail rotor adapter and shaft and led to their eventual failure. A review of the helicopter maintenance manual and operator's approved aircraft inspection program revealed that neither had a requirement for the tail rotor assembly to be inspected for security.

## Flight Events

Maneuvering-hover - Aircraft structural failure

## Probable Cause

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the No. 3 tail rotor adapter and shaft due to a loss of torque on the retaining nut. Contributing to the accident was the lack of a requirement to inspect the tail rotor assembly for security in the helicopter manufacturer's maintenance manual and the operator's approved aircraft inspection program.

## Findings

Aircraft-Aircraft propeller/rotor-Tail rotor drive system-Tail rotor drive shaft-Fatigue/wear/corrosion - C

Aircraft-Aircraft propeller/rotor-Tail rotor drive system-Tail rotor drive shaft-Failure - C

Organizational issues-Management-Policy/procedure-Adequacy of policy/proc-Manufacturer - F

Organizational issues-Management-Policy/procedure-Adequacy of policy/proc-Operator - F

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	32
<b>Airplane Rating(s):</b>	None	<b>Instrument Rating(s):</b>	Helicopter
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Instructor Rating(s):</b>	Instrument Helicopter
<b>Flight Time:</b>	2201 hours (Total, all aircraft), 28 hours (Total, this make and model), 1207 hours (Pilot In Command, all aircraft), 97 hours (Last 90 days, all aircraft), 2626 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	BELL	<b>Registration:</b>	N496AE
<b>Model/Series:</b>	407	<b>Engines:</b>	1 Turbo Shaft
<b>Operator:</b>	Air Evac EMS, Inc.	<b>Engine Manufacturer:</b>	Rolls Royce
<b>Air Carrier Operating Certificate:</b>	On-demand Air Taxi (135)	<b>Engine Model/Series:</b>	M250-C47B
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Non-scheduled - Air Medical (Discretionary)		

## Meteorological Information and Flight Plan

<b>Observation Facility, Elevation:</b>	KSAT, 809 ft msl	<b>Weather Information Source:</b>	Unknown
<b>Conditions at Accident Site:</b>	Visual Conditions	<b>Lowest Ceiling:</b>	None
<b>Condition of Light:</b>	Night	<b>Wind Speed/Gusts, Direction:</b>	5 knots, 130°
<b>Temperature:</b>	21° C / 12° C	<b>Visibility</b>	10 Miles
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	San Antonio, TX (KSAT)	<b>Destination:</b>	San Antonio, TX (XS83)

## Airport Information

<b>Airport:</b>	San Antonio International (KSAT)	<b>Runway Surface Type:</b>	
<b>Runway Used:</b>	N/A	<b>Runway Surface Condition:</b>	Dry
<b>Runway Length/Width:</b>			

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	2 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Arnold W Scott	<b>Adopted Date:</b>	08/01/2016
<b>Note:</b>	The NTSB did not travel to the scene of this accident.		
<b>Investigation Docket:</b>	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=92279">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=92279</a>		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.