



National Transportation Safety Board Aviation Accident Final Report

Location:	Sullivan, OH	Accident Number:	CHI06LA124
Date & Time:	05/03/2006, 1900 EDT	Registration:	N9471F
Aircraft:	Hughes 269B	Aircraft Damage:	Substantial
Defining Event:		Injuries:	1 None

Flight Conducted Under: Part 91: General Aviation - Personal

Analysis

The helicopter was substantially damaged when a tail boom support fitting failed during cruise flight, which resulted in a secondary failure of the tail rotor drive shaft. The pilot initiated an autorotation and encountered a ditch during touchdown, causing the right skid to collapse. The pilot reported that the helicopter was in cruise flight when he heard a "very loud" bang. He stated that the aircraft began to yaw and he subsequently determined the aircraft had no tail rotor authority. He set up for a run-on landing to a field; however, he subsequently heard a "metal grinding sound" and a "high pitched squealing noise." He initiated an autorotation at that time. The pilot reported a "sensation of the tail boom swinging left [and] right, up [and] down." The helicopter encountered a ditch during touchdown, which collapsed the right skid. Upon exiting the helicopter, the pilot noticed that the left main tail boom support (cluster) fitting had broken loose from the frame. The tail rotor drive shaft and cluster fitting were examined by the National Transportation Safety Board Materials Laboratory. Damage to the tail rotor drive shaft was consistent with an overstress failure and appeared to be caused by rotational contact between the drive shaft and the forward tail boom closure fitting. The cluster fitting exhibited fracture markings indicative of fatigue. Fracture features on both lugs indicated localized fatigue origin areas on the outer surfaces of each lug. Federal Aviation Administration (FAA) Airworthiness Directive (AD) 2003-13-15 R1, which became effective August 10, 2004, was applicable to the accident aircraft. The AD noted that compliance was required in order "to prevent failure of a tailboom support strut or lug on a cluster fitting." The AD required modification or replacement of the original cluster fittings, part numbers 269A2234 and 269A2235, within 6 months or 150 hours time-in-service (TIS). The AD required dye penetrant inspections of the lugs within 10 hours TIS, and thereafter at intervals not to exceed 50 hours TIS, until the lugs were modified or replaced. Nominal measured lug thickness was 0.076 inch, which was consistent with the original cluster fitting configuration. The failed lug did not appear to have been modified and did not appear to be in compliance with the AD. Review of the aircraft logbook revealed that a 100 hour / annual inspection was completed on May 23, 2005. The inspection entry noted AD 2003-13-15 R1. In addition, the airworthiness compliance record noted that the AD had been complied with by performing a dye penetrant inspection without finding any cracks. The entry also stated that the modification kit was not installed at that time.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Fatigue failure of the fuselage-to-tail boom cluster fitting, and the secondary failure of the tail rotor drive shaft. An additional cause was the incomplete compliance with an applicable Airworthiness Directive. A factor was the ditch.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE - NORMAL

Findings

1. (C) FUSELAGE, ATTACHMENT - FATIGUE
2. (C) ROTOR DRIVE SYSTEM, TAIL ROTOR DRIVE SHAFT - FAILURE
3. (C) MAINTENANCE, COMPLIANCE WITH AD - NOT COMPLIED WITH - OTHER MAINTENANCE PERSONNEL

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings

4. AUTOROTATION - INITIATED - PILOT IN COMMAND

Occurrence #3: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER
Phase of Operation: EMERGENCY LANDING

Findings

5. (F) TERRAIN CONDITION - DITCH
6. LANDING GEAR, SKID ASSEMBLY - COLLAPSED

Factual Information

On May 3, 2006, about 1900 eastern daylight time, a Hughes 269B, N9471F, piloted by a commercial pilot, was substantially damaged during a forced landing following a failure of the tail rotor drive shaft during cruise flight near Sullivan, Ohio. The personal flight was being conducted under 14 CFR Part 91 without a flight plan. Visual meteorological conditions prevailed at the time. The pilot was not injured. The local flight departed the pilot's private property near Sullivan, Ohio, about 1820.

The pilot reported that the helicopter was in level flight approximately 600 feet above ground level (agl), when he heard a "very loud" bang. He stated that the aircraft began to yaw and he subsequently determined the aircraft had no tail rotor authority. He set up for a run-on landing to a field; however, he subsequently heard a "metal grinding sound" and a "high pitched squealing noise." He initiated an autorotation at that time.

The pilot reported a "sensation of the tail boom swinging left [and] right, up [and] down." The helicopter encountered a ditch during touchdown, which collapsed the right skid. Upon exiting the helicopter, the pilot noticed that the left main tail boom support (cluster) fitting had broken loose from the frame.

The tail rotor drive shaft and cluster fitting were examined by the National Transportation Safety Board Materials Laboratory. Damage to the tail rotor drive shaft was consistent with rotational contact between the drive shaft and another component. The drive shaft failed at the point where it passed through a clearance hole in the forward tail boom closure fitting. The fitting also exhibited features consistent with contact by a rotating component. The tail rotor drive shaft fracture surfaces were consistent with an overstress failure.

The cluster fitting exhibited fracture markings indicative of fatigue. Fracture features on both lugs indicated localized fatigue origin areas on the outer surfaces of each lug. On the lower lug, the fatigue propagated nearly through the entire cross section before final fracture. On the upper lug, the fatigue penetrated approximately 35 percent of the cross section before final fracture. Surface corrosion was visible on the lower lug near the fatigue origin area. No corrosion existed at the fatigue origin on the upper lug.

Federal Aviation Administration (FAA) Airworthiness Directive (AD) 2003-13-15 R1, which became effective August 10, 2004, was applicable to the accident aircraft. The AD noted that compliance was required in order "to prevent failure of a tailboom support strut or lug on a cluster fitting." The AD required modification or replacement of the original cluster fittings, part numbers 269A2234 and 269A2235, within 6 months or 150 hours time-in-service (TIS). The AD required dye penetrant inspections of the lugs within 10 hours TIS, and thereafter at intervals not to exceed 50 hours TIS, until the lugs were modified or replaced.

Nominal measured lug thickness was 0.076 inch. This was consistent with cluster fitting part numbers 269A2234 and 269A2235. The failed lug did not appear to have been modified.

Review of the aircraft logbook revealed that a 100 hour / annual inspection was completed on May 23, 2005, at 3,686 hours total aircraft flight time. The entry noted that AD 2003-13-15 R1 was complied with at that time. The airworthiness compliance record for that date noted AD 2003-13-15 R1, and stated that it had been complied with by performing a dye penetrant inspection without finding any cracks. The entry also noted that the modification kit was not installed at that time.

Pilot Information

Certificate:	Commercial	Age:	56, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last Medical Exam:	05/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	08/01/2004
Flight Time:	2300 hours (Total, all aircraft), 1000 hours (Total, this make and model), 2300 hours (Pilot In Command, all aircraft), 35 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Hughes	Registration:	N9471F
Model/Series:	269B	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	106-0267
Landing Gear Type:	Skid	Seats:	2
Date/Type of Last Inspection:	05/01/2005, Annual	Certified Max Gross Wt.:	1670 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	3681 Hours	Engine Manufacturer:	Lycoming
ELT:	Not installed	Engine Model/Series:	HIO-360-A1A
Registered Owner:	On file	Rated Power:	180 hp
Operator:	On file	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Observation Facility, Elevation:	MFD, 1297 ft msl	Observation Time:	1852 EDT
Distance from Accident Site:	17 Nautical Miles	Condition of Light:	Day
Direction from Accident Site:	220°	Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	20° C / 10° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	3 knots, Variable	Visibility (RVR):	
Altimeter Setting:	30.01 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sullivan, OH (PVT)	Type of Flight Plan Filed:	None
Destination:		Type of Clearance:	None
Departure Time:	1820 EDT	Type of Airspace:	

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None		

Administrative Information

Investigator In Charge (IIC):	Tim Sorensen	Adopted Date:	03/26/2007
Additional Participating Persons:	Brian Riddle; FAA-Cleveland FSDO; Cleveland, OH		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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