Aviation Investigation Final Report

Location:	Moulton, Alabama	**Accident Number:**	MIA07FA098
Date & Time:	May 13, 2007, 17:30 Local	**Registration:**	N468WE
Aircraft:	Hughes 369A	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot recently purchased the helicopter through an aircraft broker. An annual inspection was done prior to the sale, at which time a main rotor blade was replaced and the other three were overhauled. The accident occurred on the fourth flight of the day of a multiple-leg cross-country flight. The flight departed from one of several planned fuel stops. No flight plan was filed, and searchers found the fire- and impact-damaged wreckage 2 days later in wooded terrain. Three of the four main rotor blades were found separated from the main rotor hub with one of the blades located about 1,100 feet from the main wreckage, consistent with an in-flight separation. A National Transportation Safety Board materials engineer examined the blade retention strap assemblies, and no preexisting material issues were identified to explain why one or more main rotor blades could have separated prior to impact.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The separation of a main rotor blade from its tension torsion bar for an undetermined reason.

Findings

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

Findings
1. ROTOR SYSTEM,MAIN ROTOR TENSION TORSION BAR - SEPARATION

2. REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CRUISE

Findings
3. AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - UNCONTROLLED

Findings
4. TERRAIN CONDITION - TREE(S)

Factual Information

HISTORY OF FLIGHT

On May 13, 2007, about 1730 central daylight time, a Hughes 369A, N468WE, registered to and operated by an individual, impacted terrain in the Bankhead National Forest near Moulton, Alabama. The helicopter was destroyed and the commercial pilot was killed. Visual meteorological conditions prevailed at the time of the accident and no flight plan was filed for the personal flight conducted under the provisions of 14 Code of Federal Regulations Part 91.

Information obtained from family members and local authorities revealed the pilot had recently purchased the helicopter from a private individual through a broker in Lakeland, Florida. The pilot was flying the helicopter back to Kansas, where he resided. On May 13, about 1645, he departed from the Merkel Field Sylacauga Municipal Airport (SCD), Sylacauga, Alabama, which was one of his planned fuel stops. He was flying to the Northwest Alabama Regional Airport (MSL), Muscle Shoals, Alabama. His route of flight took him over the area of Moulton, which at that time the pilot canceled the flight following and shortly there after, was lost from radar. On May 15 at 1130, the helicopter wreckage was located in the Bankhead National Forest by local authorities, which were searching for the helicopter after it was lost from radar. The search efforts were hindered due to a forest fire started by the helicopter crash. An estimated 10 acres of the forest's undergrowth was burnt.

PERSONNEL INFORMATION

The pilot, age 26, held a commercial pilot certificate with ratings for airplane single engine land and rotorcraft helicopter, and a private pilot certificate for multiengine airplane. He held a mechanic certificate with ratings of airframe and powerplant, and inspection authorization. He was issued a second-class medical certificate on May 05, 2006, with no limitation. The pilot documented, at the time of the medical, a total of 8,500 flight hours in all aircraft. Copies of the pilot's airplane logbook, dating up to April 28, 2007, were reviewed. He had documented 7,505 total hours at that time. His pilot's logbook for helicopter was not located.

AIRCRAFT INFORMATION

The helicopter was delivered to the United States Military in 1968 as an OH-6A. The helicopter was converted to a Hughes 369A and registered in the normal category in 2004.

The helicopter's maintenance records were on board the helicopter at the time of the accident and are presumed to have been destroyed. An aircraft component sheet from Lance Aviation Inc, the aircraft broker, advertised the helicopter, as a Hughes 369A, with a total airframe time of 3,984 hours and a "C20C" engine with 3, 361 hours remaining.

According to the broker, the helicopter had both of the tail rotor blades overhauled and three of the main rotor blades overhauled and one replaced, and an annual inspection accomplished just prior to the sale to the pilot. The maintenance and annual inspection were conducted by an individual airframe and powerplant mechanic with inspection authorization.

METEOROLOGICAL INFORMATION

The closest official weather observation station was Muscle Shoals, Alabama, 56 miles northwest of the accident site. On May 13, at 1753, an Aviation Routine Weather Report (METAR) recorded in part, winds variable at 6 knots; visibility, 10 statute miles; clear skies; temperature 84 degrees Fahrenheit (F); dew point 46 degrees F; altimeter 30.05 inches of mercury.

COMMUNICATION

The flight was in contact with the Birmingham Air Traffic Control, which was providing visual flight rules flight following services. The pilot canceled the flight following, and shortly thereafter radar contact was lost. The last radar hit was at 1729:58. At that time the helicopter was about 1,200 feet mean sea level (msl), and located at latitude north 34 degrees 20 minutes 43 seconds and longitude west 87 degrees 16 minutes 13 seconds. No distress calls were received prior to or after the loss of radar contact.

WRECKAGE AND IMPACT INFORMATION

The wreckage of the helicopter was located in the bottom of a ravine at an elevation of 783 msl. The ravine was in a densely forested area and contained a significant amount of undergrowth. The damage to the surrounding trees indicated that the helicopter's direction of flight was approximately 330 to 350 degrees at impact. Evidence also indicated that the helicopter fuselage descended near vertically at a high rate of descent, with minimal forward airspeed; impacting the ground nose low, left side low, and in a near inverted attitude. A postcrash fire ensued and consumed nearly the entire fuselage except for a large section of the tailboom structure. The helicopter's main rotor blades were not found among the wreckage. Odor of Jet A fuel was present at the crash site.

The engine was located on top of the burnt fuselage and had been subjected to extensive fire damage. All engine parts and components (accessory gearbox, fuel control, governor, tubing and lines, control rods, etc.) except those manufactured from hardened metal were destroyed. Engine model could not be identified. The only data plate located in the wreckage was that of the compressor, with an overhaul stamp of 10/92 with 2090 hours. The remnants of the engine were examined. Fractures at the root of the turbine blades around the entire circumference of the fourth stage turbine wheel and heavy scoring in the blade paths of the third and fourth stage turbine wheels were consistent with the engine operating at the time of impact.

The upper and lower vertical fin and horizontal stabilizer of the tail empennage displayed impact and fire damage. The tail rotor blades were consumed in the postcrash fire with only a 6-inch section of one blade tip and the other blades stainless steel abrasion strips remaining. The tail rotor hub and pitch control assemblies were present and displayed fire damage.

The cockpit structure was destroyed by impact forces and fire. The cockpit structure, canopy frame, glass windscreens, overhead transparencies, instrument panel, and console components were distributed in a radius of approximately 50 feet from the wreckage. A canopy door, canopy vents, glass pieces, lower cockpit frame, as well as pilot's personal effects were located up to 150 feet from the main wreckage site, along the route of flight.

One of the main rotor blades, attached to the main rotor hub assembly, the static mast, upper flight controls, and main transmission, attached to the separated fuselage mount deck, were located about 185 feet southeast of the main wreckage. The missing three blades were located southeast of the main wreckage; one at 185 feet, the second 202 feet, and the third at 1,100 feet from the wreckage. The wide dispersal of the helicopter's blades and components were consistent with in flight separation. All main rotor blades were in one piece but exhibited some damage to the spars, wrinkling and punctured blade skins and trailing edge separation. Two of the blades were bent upward approximately 45-degree at near mid-span while the other two blades were relatively straight. Damage to the blades were consistent with, post separation, contact with trees, ground, and exposure to the heat from the forest fire.

The central hub subassembly, pitch change housing assemblies, blade dampers, the blade retention strap assemblies, and the separated transmission mount deck were retained by the National Transportation Safety Board for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination of the pilot was conducted under the authority of the Alabama State Medical Examiner, Huntsville, Alabama, on May 16, 2007. The cause of death for the pilot was attributed to blunt force, traumatic injuries.

The FAA's Civil Aeromedical Institute (CAMI) conducted a toxicological examination on June 13, 2007, which was negative for alcohol or drugs.

TEST AND RESEARCH

A Garmin GPSMAP 496 was recovered from the wreckage and sent to the Safety Board's Vehicle Recorder Laboratory. Data recovered from the GPS recorded the four flights on the day of the accident. The accident flight departed from SCD at approximately 1636 and flew a course of 320 to 330 degrees. The helicopter had been cruising between 1,000 and 1,500 ft GPS altitude at a groundspeed of approximately 110 mph for most of the en route portion of this flight. The last GPS position update recorded at 1729:27, about 194 feet from where the main wreckage was located, placed the helicopter at a latitude of north 34 degrees 19.224

minutes, longitude west 87 degrees 15.153 minutes, with a GPS altitude of 1,314 feet. The helicopter was traveling at approximately 88 mph groundspeed just prior to the last recorded position.

The retained central hub subassembly, pitch change housing assemblies, blade dampers, the blade retention strap assemblies, and the separated transmission mount deck where examined by the Safety Board's Materials Office of Research and Engineering. The strap assemblies were fractured in multiple locations with the outboard ends retained in the pitch housings and center sections in the hub assembly. The blade retaining pins were in-place holding both the strap pieces and the blade upper and lower lead-lag links. Magnified optical examinations of the individual strap fractures revealed indications consistent with ductile tensile overstress separations at all fracture locations. The fractures at the No. 2 blade location, as documented in materials laboratory factual report 08-037, were through the strap on either side of the outboard blade retention pin hole. The outboard side of the individual straps were deformed and wrinkled around the pin holes. The deformation was consistent with compression buckling of the material from pin loads. The other strap ends from the No. 2 blade location also contained similar deformation to greater or lesser extents. Close inspections of the fractures in the No. 2 blade location straps found that the fractures adjacent to the holes had propagated through and partially followed the wrinkled and deformed areas indicating that the deformation preceded the fractures. No corrosion was noted on the straps.

The blade damper assemblies remained bolted to the pitch housings. The hub and individual pitch housings were fractured in various locations. Magnified optical examinations of these components revealed features consistent with overstress separations at all fracture locations. No indications of preexisting cracking were uncovered.

The transmission mount deck section was fractured from the surrounding fuselage structure. Magnified examinations found features and fracture patterns consistent with overstress fracturing of the supporting fuselage structure. No indications of preexisting cracking or corrosion were observed.

Pilot Information

Certificate:	Commercial; Private	**Age:**	26,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	May 22, 2006
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 5, 2006
Flight Time:	8500 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Hughes	**Registration:**	N468WE
Model/Series:	369A	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	280285
Landing Gear Type:	Skid	**Seats:**	4
Date/Type of Last Inspection:	May 1, 2007 Annual	**Certified Max Gross Wt.:**	2250 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:	3984 Hrs as of last inspection	**Engine Manufacturer:**	ALLISON
ELT:	Not installed	**Engine Model/Series:**	250-C20 SER
Registered Owner:	On file	**Rated Power:**	250 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MSL,550 ft msl	**Distance from Accident Site:**	56 Nautical Miles
Observation Time:	17:53 Local	**Direction from Accident Site:**	145°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	29°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sylacauga, AL (SCD)	**Type of Flight Plan Filed:**	None
Destination:	Muscle, AL (MSL)	**Type of Clearance:**	VFR;VFR flight following
Departure Time:	16:45 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	Obregon, Jose
Additional Participating Persons:	Jack E Clark; FAA/FSDO; Birimingham, AL Adrian Booth; The Boeing Company; Mesa, AZ Jeff Edwards; Rolls-Royce; Indianapolis, IN
Original Publish Date:	December 28, 2008
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=65794