Aviation Investigation Final Report

Location:	FORT MYERS, Florida	**Accident Number:**	MIA00TA070
Date & Time:	January 20, 2000, 13:30 Local	**Registration:**	N853M
Aircraft:	Bell UH-1H	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Public aircraft		

Analysis

According to the pilot, he was about 30 minutes into the post inspection maintenance flight at about 350 to 400 feet agl, when he heard a loud 'bang' and engine rpm decayed to zero. His choice of autorotation site required use of main rotor rpm to clear trees and he landed hard and rolled over. The T-53-L-13B engine underwent factory disassembly examination, with FAA oversight. Material analysis determined that portions of the 2nd stage GP turbine disc had fractured and separated due to peak strain low cycle fatigue, resulting in structural and imbalance damage and engine failure. No material, lubrication, or fuel control defects were identified that would have contributed to the disc separation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

A total loss of engine power due to turbine wheel fracture resulting from fatigue for undetermined reasons that resulted in an autorotation to unsuitable terrain and hard touchdown and rollover.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: MANEUVERING

Findings
1. (C) TURBINE ASSEMBLY,TURBINE WHEEL - FATIGUE

2. (C) REASON FOR OCCURRENCE UNDETERMINED
3. (C) TURBINE ASSEMBLY,TURBINE WHEEL - FRACTURED

Occurrence #2: HARD LANDING
Phase of Operation: EMERGENCY LANDING

Findings
4. TERRAIN CONDITION - NONE SUITABLE

Occurrence #3: ROLL OVER
Phase of Operation: LANDING

Factual Information

On January 20, 2000, about 1330 eastern standard time, a Bell UH-1H, N853M, registered to the Lee County Mosquito Control District, operating as a Title 14 CFR Part 91 public-use flight, crashed while maneuvering in the vicinity of Fort Myers, Florida. Visual meteorological conditions prevailed and no flight plan was filed. The rotorcraft received substantial damage and the commercially-rated pilot, the sole occupant, sustained minor injuries. The flight originated from Lehigh Acres, Florida, about 30 minutes before the accident.

According to the pilot, the rotorcraft was being routinely flown for off season maintenance prevention when, between 350 and 400 feet agl, he heard a loud "bang", the engine fail light illuminated, engine rpm decayed to zero, and rotor rpm indicated between 298 and 304. The pilot performed an autorotation, and the rotorcraft sustained a hard touchdown and rollover about 6 miles southwest of Southwest Florida International Airport.

According to an FAA inspector, eyewitnesses reported hearing a loud "popping sound" shortly before observing the rotorcraft perform an autorotation to an area southwest of Fort Myers known as Mulloch Creek. The touchdown was hard enough to cause the left landing skid to separate and the main rotor blades to collide with the tail boom and terrain. The tail boom was severed and separated. The airframe came to rest on its side, and debris in the tailpipe was determined to be remnants of turbine disc and blades. According to engine maintenance records, the Lycoming T53-L-13B turbine engine, serial no. LE-24073, was installed in N853M on March 17, 1998, at an engine time of 774 hours since overhaul. On January 19, 2000, the engine underwent a 50-hour inspection at an engine time of 924 hours since overhaul.

The engine was removed and sent to the Honeywell Product Safety and Integrity facility for material failure analysis, under FAA oversight. Adjacent to the engine data plate was affixed a Corpus Christi Army Depot, (CCAD) overhaul plate; however, the spaces for "overhaul date" and "time since new" had been marked with an "N/A". Records at CCAD revealed the engine was test cell run on April 8, 1993, but never repaired or overhauled. Disassembly inspection of the core engine by factory inspectors revealed that a section of the 2nd stage GP turbine disc, P/N 1-100-063-05, had fractured and separated due to sustained peak strain low cycle fatigue. The separation of the section of turbine disc resulted in liberation of disc and blade fragments that caused secondary damage to the downstream 1st stage PT nozzle, 1st stage PT disc and 2nd stage PT nozzle and disc, as well as lesser damage to the upstream 2nd stage GP turbine nozzle, 1st stage GP turbine disc, and 1st stage GP turbine nozzle. The subsequent disc rotational imbalance caused GP spool interference between the axial and centrifugal blades with their respective shrouds, resulting in blade tip rubbing. Additionally, the imbalance of the GP spool caused relative movement and interference between the aft internal splines of the GP spool and the aft GP turbine cone. This condition was evidenced by

impressions found on the aft GP turbine cone and the fracture of the sun gear retaining bolt washer.

No material defects were revealed that would have led to the disc separation. No evidence of improper lubrication or fuel servicing that could have contributed to the disc separation was revealed. The original engine was assembled at the factory, Stratford, Connecticut, in October 1974; however, the Lycoming complete service history of the military surplus 2nd stage GP turbine disc could not be determined from records provided by the operator. Factory inspectors stated they had not seen such corrosion of the 1st stage GP turbine nozzle retaining bolts and erosion of the bearing housing heat shield in a 924 hour-since-overhaul engine before. See the Honeywell Teardown Report of Model T53-L-13B Turboshaft Engine, serial no. LE-24073, an attachment to this report.

Pilot Information

Certificate:	Commercial	**Age:**	56,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	February 23, 1999
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	20840 hours (Total, all aircraft), 3400 hours (Total, this make and model), 21900 hours (Pilot In Command, all aircraft), 60 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N853M
Model/Series:	UH-1H UH-1H	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal; Restricted (Special)	**Serial Number:**	68-16087
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	January 19, 2000 Continuous airworthiness	**Certified Max Gross Wt.:**	9500 lbs
Time Since Last Inspection:	1 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	6215 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	T-53-L-13B
Registered Owner:	LEE COUNTY MOSQUITO CONTROL	**Rated Power:**	1400 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RSW ,31 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	60°
Lowest Cloud Condition:	Scattered / 6000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	15 knots / 22 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	27°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LEHIGH ACRES , FL (X56)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	13:00 Local	**Type of Airspace:**	Class C

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	Rough;Vegetation
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	26.510194,-81.700988(est)

Administrative Information

Investigator In Charge (IIC):	Stone, Alan
Additional Participating Persons:	VICTOR ROXAS; TAMPA , FL
Original Publish Date:	April 6, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=48510