



Aviation Investigation Final Report

Location:	KEYSTONE, South Dakota	Accident Number:	DEN85FA180
Date & Time:	July 6, 1985, 11:09 Local	Registration:	N5410W
Aircraft:	HUGHES 369HS	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	4 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation		

Analysis

MAIN ROTOR HUB WAS OVERHAULED BY A REPAIR STATION THAT WAS NOT AUTHORIZED BY HUGHES HELICOPTERS FOR HUB OVERHAULS. THE MAIN ROTOR HUB AND BLADES SEPARATED IN-FLT 279 HRS AFTER OVERHAUL. THE ACFT CRASHED IN A DENSELY WOODED AREA. POST ACCIDENT EXAM OF THE MAIN ROTOR SYSTEM REVEALED THE TORSION-TENSION STRAP PACK FAILED DUE TO FATIGUE CRACKING IN THE STAINLESS STEEL LAMINANTS. METALLURGICAL EXAM REVEALED EVIDENCE OF CORROSION PITTING IN THE LAMINANTS. THE CORROSION PITS WERE THE ORIGIN OF FATIGUE CRACKS. THE MAXIMUM ALLOWABLE NUMBER OF LAMINANT FAILURES IN ANY ONE STRAP IS 3. THE FAILED STRAP PACK CONTAINED 9 FATIGUE FAILED LAMINANTS.

Probable Cause and Findings

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

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: APPROACH - VFR PATTERN - BASE TURN

Findings

1. (C) ROTOR SYSTEM, MAIN ROTOR BLADE - SEPARATION
2. (C) ROTOR SYSTEM, MAIN ROTOR HUB - SEPARATION

3. (C) MAINTENANCE, OVERHAUL - IMPROPER - OTHER MAINTENANCE PERSONNEL

Occurrence #2: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: APPROACH - VFR PATTERN - BASE TURN

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT

Phase of Operation: DESCENT - UNCONTROLLED

Findings

4. OBJECT - TREE(S)

Factual Information

Pilot Information

Certificate:	Commercial	Age:	24, Male
Airplane Rating(s):	Single-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:	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	Last FAA Medical Exam:	May 13, 1985
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	1479 hours (Total, all aircraft), 500 hours (Total, this make and model), 1389 hours (Pilot In Command, all aircraft), 87 hours (Last 90 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	HUGHES	Registration:	N5410W
Model/Series:	369HS 369HS	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	900255S
Landing Gear Type:	High skid	Seats:	5
Date/Type of Last Inspection:	September 5, 1984 Annual	Certified Max Gross Wt.:	2550 lbs
Time Since Last Inspection:	100 Hrs	Engines:	1 Turbo shaft
Airframe Total Time:	7007 Hrs	Engine Manufacturer:	ALLISON
ELT:	Not installed	Engine Model/Series:	250-C18B
Registered Owner:		Rated Power:	278 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:		Distance from Accident Site:	
Observation Time:		Direction from Accident Site:	
Lowest Cloud Condition:	Clear	Visibility	20 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	5 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	0°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	29°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		Type of Flight Plan Filed:	None
Destination:		Type of Clearance:	None
Departure Time:	11:05 Local	Type of Airspace:	Class G

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:	4400 ft msl	Runway Surface Condition:	
Runway Used:	0	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Destroyed
Passenger Injuries:	4 Fatal	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Fatal, 1 Serious	Latitude, Longitude:	43.889007,-103.420616(est)

Administrative Information

Investigator In Charge (IIC): Feith, Gregory

Additional Participating Persons: RICHARD F BRANDIGER; RAPID CITY , SD
MARSHALL BURQUIST; LOS ANGELES , CA
SAMUEL BRODIE; DALLAS , TX
BUD PURCELL; AURORA , CO

Original Publish Date:

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=16544>

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