Aviation Investigation Final Report

Location:	NUNDA, South Dakota	**Accident Number:**	CHI97LA004
Date & Time:	October 6, 1996, 08:00 Local	**Registration:**	N7925J
Aircraft:	Bell 47G-5	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

During the second agricultural load, a total loss of engine power occurred, and the pilot made an autorotative landing, but the helicopter was damaged during the occurrence. Examination of the engine revealed failure of six bolts that attached the accessory drive gear to the crankshaft. Further examination of the attachment bolts revealed that fatigue cracking had occurred. There was evidence that inadequate pre-load torque had been applied to the assembly. The engine had approximately 400 hours since its last overhaul.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: failure of maintenance personnel to properly torque the six accessory drive bolts, which resulted in fatigue failure of the undertorqued bolts.

Findings

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

Findings
1. (C) ACCESSORY DRIVE ASSY - UNDERTORQUED
2. (C) MAINTENANCE,OVERHAUL - INADEQUATE - OTHER MAINTENANCE PERSONNEL
3. (C) ACCESSORY DRIVE ASSY - FATIGUE

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

Findings
4. AUTOROTATION - PERFORMED - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: EMERGENCY LANDING

Factual Information

On October 6, 1996, at 0800 central daylight time (cdt), a Bell 47G-5, N7925J, registered to Wayne Hursey Aerial Blades, of Flandreau, South Dakota, piloted by a commercial helicopter pilot, was substantially damaged following a loss of engine power and subsequent autorotion near Nunda, South Dakota. The pilot reported no injuries. The 14 CFR Part 137 flight was operating in visual meteorological conditions. No flight plan was on file. The flight departed Flandreau Airport, Flandreau, South Dakota, at 0640 cdt.

According to the pilot's written statement he was flying his second agricultural chemical load that morning when the engine loss total power. The pilot successfully autorotated the helicopter.

Post accident examination of the helicopter by a Federal Aviation Administration Principal Maintenance Inspector (PMI), stated that a teardown of the engine revealed six sheared accessory drive gear bolts. The six attachment bolts, three lock plates, three dowel pins, shaft assembly and the accessory drive gear were sent to the NTSB's Materials Laboratory for further examination. The attachment bolts for this assembly separated at the thread area located between approximately 0.1 and 0.3 inches below the lower surface of the bolt head. Fragments of these bolts were found attached to the accessory drive gear. The surface of the shaft facing the lock plates contained fretting damage all around the bolt through holes. The dowel pin through holes on the shaft contained elongation damage and the diameter surface of each dowel pins was severely burnished. No cracking was found on the shaft, accessory drive gear, and dowel pins. This engine assembly separated 400 hours since the last overhaul. The metallurgist's factual report is enclosed with this report.

Pilot Information

Certificate:	Commercial	**Age:**	26,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):	Helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	February 14, 1996
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	2600 hours (Total, all aircraft), 1100 hours (Total, this make and model), 2488 hours (Pilot In Command, all aircraft), 320 hours (Last 90 days, all aircraft), 160 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N7925J
Model/Series:	47G-5 47G-5	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal; Restricted (Special)	**Serial Number:**	25041
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	April 15, 1996 Annual	**Certified Max Gross Wt.:**	2800 lbs
Time Since Last Inspection:	426 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5546 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	VO-435-A
Registered Owner:	WAYNE HURSEY AREIAL BLADES	**Rated Power:**	260 Horsepower
Operator:		**Operating Certificate(s) Held:**	
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:	BKX ,1637 ft msl	**Distance from Accident Site:**	
Observation Time:	07:54 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	340°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	9°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	FLANDREAU , SD (SD18)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	07:15 Local	**Type of Airspace:**	Class G

Airport Information

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

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	44.159339,-97.010368(est)

Administrative Information

Investigator In Charge (IIC):	Carlson, Todd
Additional Participating Persons:	GARY SOLDWISCK; RAPID CITY , SD
Original Publish Date:	September 30, 1997
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=10473