Aviation Investigation Final Report

Location:	LIVE OAK, California	**Accident Number:**	LAX00LA245
Date & Time:	June 29, 2000, 09:35 Local	**Registration:**	N896RP
Aircraft:	Garlick HH-1K	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The restricted category helicopter was operating on an agricultural application flight. The pilot radioed his ground crew words to the effect that he was experiencing a structural failure. Witnesses heard the helicopter make a loud noise and when they looked up it was falling straight down from about 100 feet agl. The tail boom and tail rotor assembly were found together about 300 feet from the fuselage wreckage. The main rotor blades remained attached to the main rotor hub. The tail boom separated from the forward fuselage about 6 feet forward of the horizontal stabilizer in proximity of one of the tail rotor drive shaft couplings. The tail boom skin sections were separated at right angles to the tail boom axis, and exhibited tension tearing on the left side and compression buckling on the right side. The skin separation surfaces exhibited a shiny, uniform, bright gray appearance. The tail boom skin thickness in the area of the separation matched the manufacturer's drawing specifications. The separation surfaces of the anti-torque control tube were collapsed and exhibited a uniform shiny appearance. Circumferential scrape marks and paint transfer on the drive shaft near the coupling resembled marks on the top of the tail boom adjacent to the point of separation. The star spline gear teeth of the coupling were worn at a 45-degree angle, accompanied by circumferential gouging about 1/8-inch deep on the adjoining collar. When compared with other couplings on the drive shaft, the interior cavity of this coupling appeared dry and did not exhibit appreciable lubricant (grease). No wire or other external object impact marks were observed on the tail boom.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The inadequate lubrication of the tail rotor drive shaft coupling by unknown maintenance personnel that resulted in the in-flight failure and separation of the helicopter's tail boom.

Findings

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

Findings
1. (C) MISC ROTORCRAFT,TAIL BOOM - SEPARATION
2. (C) ROTOR DRIVE SYSTEM,TAIL ROTOR DRIVE SHAFT COUPLING - SEIZED
3. (C) MAINTENANCE,LUBRICATION - INADEQUATE - OTHER MAINTENANCE PERSONNEL

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
4. TERRAIN CONDITION - CROP

Factual Information

On June 29, 2000, at 0935 hours Pacific daylight time, a Garlick HH-1K helicopter, N896RP, was destroyed by impact with the ground following the separation of the tail boom and an uncontrolled descent at Live Oak, California. The certificated commercial pilot was fatally injured. The agricultural application flight was operated by Rick Patterson, Inc., under 14 CFR Part 137, and departed from Yuba City about 0900. Visual meteorological conditions prevailed and no flight plan was filed.

An inspector from the Federal Aviation Administration (FAA) Sacramento Flight Standards District Office reported that the helicopter was being operated in restricted category, and the pilot radioed his ground crew words to the effect that he was experiencing a structural failure. Witnesses near the accident location heard the helicopter make a loud noise, and, when they looked up, it was falling straight down from about 100 feet agl. The tail boom and tail rotor assembly were found together about 300 feet southwest of the fuselage wreckage.

The wreckage was examined by an FAA inspector with technical assistance provided by Bell Helicopters. There were no wire or other external object impact marks observed on the wreckage.

The main rotor blades remained attached to the main rotor hub. The white blade was intact, and the red blade was broken about 3-feet outboard of the root doubler but remained attached. The hub and mast remained attached to the transmission, which was with the forward fuselage wreckage. Fracture surfaces in the blade pitch control linkages exhibited a shiny, uniform appearance.

The tail boom separated from the forward fuselage about 6 feet forward of the horizontal stabilizer in proximity of the second tail rotor drive shaft coupling aft of the main rotor transmission. The tail boom skin sections were separated at right angles to the tail boom axis and exhibited tension tearing on the left side and compression buckling on the right side. The skin separation surfaces exhibited a shiny, uniform, bright gray appearance. The skin thickness on the left side was 0.025 and on the right side was 0.050. According to the Bell Helicopter representative, this was the correct skin thickness specified in production drawings. The separation surfaces of the anti-torque control tube were collapsed and exhibited a uniform shiny appearance. Circumferential scrape marks and paint transfer on the drive shaft near the coupling resembled marks on the top of the tail boom adjacent to the point of separation. The star spline gear teeth of the coupling were worn at a 45-degree angle, accompanied by circumferential gouging about 1/8-inch deep on the adjoining collar. When compared with other couplings on the drive shaft, the interior cavity of this coupling appeared dry and did not exhibit appreciable lubricant (grease). The tail rotor gearboxes turned freely when rotated by hand and the overrunning clutch engaged when turned clockwise and released when turned

counterclockwise.

An autopsy was conducted on the pilot by the Sutter County Coroner's Office, with specimens retained for toxicological testing. No alcohol or drug substances were detected.

Pilot Information

Certificate:	Commercial	**Age:**	40,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:**	Yes
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	September 13, 1999
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	9000 hours (Total, all aircraft), 35 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Garlick	**Registration:**	N896RP
Model/Series:	HH-1K HH-1K	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	157198
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	June 9, 2000 Annual	**Certified Max Gross Wt.:**	9500 lbs
Time Since Last Inspection:	27 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	6620 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	T-53-L-13
Registered Owner:	RICK PATTERSON INC.	**Rated Power:**	1400 Horsepower
Operator:		**Operating Certificate(s) Held:**	
Operator Does Business As:	RPI HELICOPTERS	**Operator Designator Code:**	P0RL

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MYV ,62 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	09:50 Local	**Direction from Accident Site:**	145°
Lowest Cloud Condition:	Scattered / 15000 ft AGL	**Visibility**	35 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	79°C / 57°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	YUBA CITY , CA (O52)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	09:00 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:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.230495,-121.779983(est)

Administrative Information

Investigator In Charge (IIC):	Parker, Richard
Additional Participating Persons:	EARL R BENEDICT; SACRAMENTO , CA JOSEPH A SYSLO, JR.; FORT WORTH , TX DARRELL DAVIS; HAMILTON , MT
Original Publish Date:	July 17, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=51212