Aviation Investigation Final Report

Location:	DAYVILLE, Oregon	**Accident Number:**	SEA97LA198
Date & Time:	August 29, 1997, 12:15 Local	**Registration:**	N22753
Aircraft:	Garlick UH-1B	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious, 2 None
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

While cruising at 2,000 feet above ground level and 100 knots, the helicopter's right transmission door separated from the aircraft, striking the tail rotor and 90-degree gearbox and knocking them off the aircraft. The pilot entered an autorotative descent to a forced landing in a field, but was unable to raise the collective for touchdown without inducing undesirable yaw. The aircraft landed hard in the forced landing. An FAA inspector found that the two rear cowl latch blocks (which attach the aft end of the separated door to the engine firewall) were missing and did not appear to have been installed, and that the cowl top latch was also unlocked. This enabled the door to lift enough to slide aft out of the front latches and separate from the aircraft. The FAA inspector subsequently found that the company mechanic who removed the latch blocks had not entered the work in the helicopter maintenance records, and that another company mechanic who reinstalled the cowls did not notice the blocks were missing and also improperly locked the top latch.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Improper installation of the transmission door by a company mechanic, resulting in inflight separation of the door (which then struck the tail rotor system) and consequent total loss of the tail rotor. Contributing to the accident were: inadequate recordkeeping by a company mechanic, and attainment of proper descent rate for the forced landing touchdown was not possible.

Findings

Occurrence #1: MISCELLANEOUS/OTHER
Phase of Operation: CRUISE

Findings
1. (F) MAINTENANCE,RECORDKEEPING - INADEQUATE - COMPANY MAINTENANCE PERSONNEL
2. (C) MAINTENANCE,INSTALLATION - IMPROPER - COMPANY MAINTENANCE PERSONNEL
3. DOOR,INSPECTION - SEPARATION
4. ROTOR SYSTEM,TAIL ROTOR - FOREIGN OBJECT DAMAGE
5. ROTOR SYSTEM,TAIL ROTOR - LOSS,TOTAL

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

Occurrence #3: HARD LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
6. (F) PROPER DESCENT RATE - NOT POSSIBLE

Factual Information

On August 29, 1997, approximately 1215 Pacific daylight time, a Garlick UH-1B restricted-category helicopter, N22753, registered to Grizzly Mountain Aviation of Prineville, Oregon, a 14 CFR 133 rotorcraft external-load operator certificate holder, was substantially damaged in an accident approximately 10 miles south of Dayville, Oregon. The accident involved a separation of the right transmission door from the aircraft while in cruising flight at approximately 2,000 feet above ground level and 100 knots. The separated transmission door struck the helicopter's tail rotor and 90-degree gearbox, knocking the 90-degree gearbox and tail rotor off the aircraft. This required the pilot to remove engine power and enter an autorotative descent to a forced landing in a field. The helicopter landed hard and sustained substantial damage in the forced landing. Of the three occupants on board, the commercial pilot-in-command and a private pilot helicopter-rated passenger (who was occupying the right front seat) were uninjured, and one passenger sustained serious injuries. Visual meteorological conditions prevailed for the 14 CFR 91 positioning flight from a logging site 10 miles south of Prairie City, Oregon to Prineville, and no flight plan had been filed.

The accident occurred about 30 minutes into the flight. The pilot reported:

> I was flying at approx[imately] 2,000 AGL when I heard and felt a loud bang from the rear of the helicopter. The aircraft yawed hard to the right and wanted to roll onto its left side. I had already put in full left pedal and I lowered the collective and started a slow right turn keeping my airspeed at approx[imately] 80 knots. The aircraft still wanted to come around so [I] rolled the throttle back enough to keep the tail behind the aircraft. I was going to make a running landing in a field but as I came up on the collective the aircraft started to turn so I went ahead and did a[n] autorotation. I did not have enough rotor RPM to cushion the aircraft in as I wanted and I bent the crossover tubes.

An FAA investigator who responded to the accident scene reported that in examining the helicopter after the accident, he found that the two rear cowl latch blocks, which attach the aft end of the separated transmission door to the forward engine firewall, were missing from the firewall. His report stated: "There was no evidence of damage to the [firewall] as would be seen if the blocks were torn off by the exiting door. It appears that the blocks were not installed at the time of the incident." He reported that the top latch, which is attached to the left transmission door and connects to a pin on the right transmission door, was also found unlocked. The FAA investigator reported that the handle for the top latch (a positive locking latch which must be manually unlocked to open) had been previously bent, preventing the locking button from dropping smoothly into place. He stated that with all three aft latches unsecured, the transmission door was being held onto the aircraft only by the friction of the front two latches on their blocks, enabling the right transmission cowl to lift enough to slide aft

out of the front latches.

The FAA investigator subsequently determined that the improper cowl installation had been performed by a Grizzly Mountain Aviation company mechanic on the day before the accident. The FAA inspector reported that a company mechanic had previously removed all four aft latch blocks for the left and right transmission cowl doors, and had subsequently reinstalled the left side blocks; however, the right side blocks remained on order. The FAA inspector stated that this mechanic did not document this work in the helicopter's maintenance records. The inspector reported that another company mechanic was then ordered to reinstall all cowl doors in order to increase allowable cruise speeds for 14 CFR 91 ferry flight operations. The second mechanic, who had been on break when the aft latch blocks were removed, installed the cowls and did not notice that the aft latch blocks on the right side were missing. The FAA inspector reported that the second company mechanic also did not properly lock the top latch connecting the left and right transmission doors.

According to the helicopter's maintenance records, the helicopter's most recent inspection was a 100-hour inspection signed off by the second Grizzly Mountain company mechanic (who reinstalled the cowls) on August 8, 1997, three weeks and approximately 15 flight hours before the accident. Additionally, the first company mechanic (who originally removed the latch blocks) signed off a daily preflight/postflight airworthiness check dated August 22, 1997, and the pilot signed off a pilot preflight on August 26, 1997.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	55,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Helicopter; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	January 24, 1997
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	12000 hours (Total, all aircraft), 3500 hours (Total, this make and model), 10000 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Garlick	**Registration:**	N22753
Model/Series:	UH-1B UH-1B	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	64-13985
Landing Gear Type:	Skid	**Seats:**	6
Date/Type of Last Inspection:	August 8, 1997 100 hour	**Certified Max Gross Wt.:**	8500 lbs
Time Since Last Inspection:	15 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	5875 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	T53-L-13B
Registered Owner:	GRIZZLY MOUNTAIN AVIATION	**Rated Power:**	1300 Horsepower
Operator:		**Operating Certificate(s) Held:**	
Operator Does Business As:		**Operator Designator Code:**	GZ9L

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**	50 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	215°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	27°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	PRAIRIE CITY , OR	**Type of Flight Plan Filed:**	None
Destination:	PRINEVILLE , OR	**Type of Clearance:**	None
Departure Time:	11:40 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:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 2 None	**Latitude, Longitude:**	44.459861,-119.500869(est)

Administrative Information

Investigator In Charge (IIC):	Nesemeier, Gregg
Additional Participating Persons:	GORDON A READ; HILLSBORO , OR
Original Publish Date:	February 2, 1998
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=42682