



## **Unlatched Transmission Cowl Door Separates in Flight, Strikes and Disables Tail Rotor and Gearbox**

*Helicopter damaged in hard emergency landing and one occupant suffered serious injuries. Investigation disclosed two door latches were missing and one was improperly secured.*

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*FSF Editorial Staff*

On Aug. 29, 1997, a Garlick (formerly Bell) UH-1B “Huey” was in cruise flight when the transmission cowl door separated from the helicopter and struck the tail rotor and 90-degree gearbox. The tail rotor and gearbox then separated from the aircraft. The helicopter was substantially damaged in the subsequent forced landing, and one of the three occupants suffered serious injuries. The other two occupants were not injured.

The U.S. National Transportation Safety Board (NTSB) said the probable causes of the accident were improper installation of the transmission-cowl door by a maintenance technician and the consequent loss of the tail rotor.

The accident occurred 10 miles south of Dayville, Oregon, U.S., at about 1215 hours local time. The helicopter, operated by Grizzly Mountain Aviation of Prineville, Oregon, was being ferried to Prineville from a logging site 10 miles south of Prairie City, Oregon.

Weather conditions included clear skies and more than 50 miles [80 kilometers] visibility. Temperature was 80 degrees Fahrenheit [27 degrees Celsius]. The winds were from 215 degrees at variable velocity.

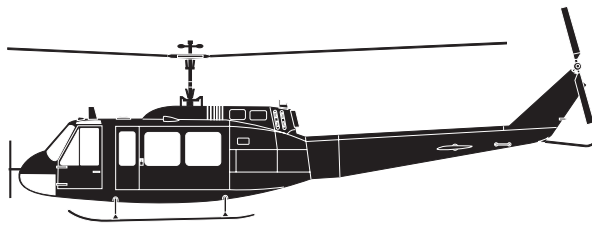
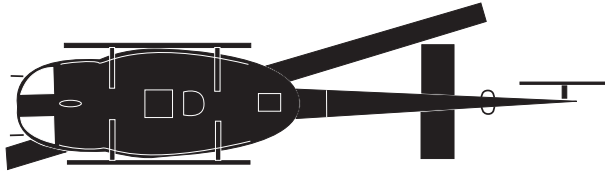


The pilot, 55, held a commercial helicopter-pilot license and flight-instructor and instrument ratings issued by the U.S. Federal Aviation Administration (FAA). He had 12,000 hours of flying experience, including 3,500 hours in UH-1 helicopters.

About 30 minutes after taking off from the logging site with two passengers aboard the helicopter, the pilot turned from the westerly course to Prineville and flew south along a river to inspect an area of timber for sale.

The pilot said that he was flying the helicopter at 100 knots, level at about 2,000 feet above mountainous terrain (5,000 feet above sea level) when he “heard and felt a loud bang from the rear of the helicopter.” The aircraft then yawed hard to the right and began rolling to the left. The pilot said that he fully deflected the left tail-rotor pedal and lowered the collective. He said that he tried to maintain airspeed at about 80 knots.

“The aircraft still wanted to come around, so I rolled the throttle back enough to keep the tail behind the aircraft,” said the pilot. “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 an autorotation.” The pilot



### Garlick (Bell) UH-1B

Bell Aircraft developed the Model 204 to compete for a U.S. Army contract to build a utility helicopter suitable for evacuating casualties from front-line battle areas and for instrument flight training. The Model 204 won the contract in 1955 and was given the military designation HU-1. The U.S. Army named the helicopter the “Iroquois,” but the HU-1 designation prompted the nickname “Huey.” The military designation later was changed from HU-1 to UH-1, and the first production helicopters were designated UH-1A.

The UH-1A is a six-seat helicopter with an 860-shaft-horsepower Lycoming T53-L-1A turboshaft engine derated to 770 shaft horsepower. The UH-1B, produced from 1961 to 1965, has accommodations for two crewmembers and seven passengers. Early production helicopters have a 960-shaft-horsepower Lycoming T53-L-5 engine; later versions have a 1,100-shaft-horsepower Lycoming T53-L-11 engine. Bell built about 76 Model 204Bs — commercial versions of the UH-1B.

Garlick Helicopters Inc. of Hamilton, Montana, U.S., refurbishes military versions of the helicopter for civilian use. Garlick UH-1B helicopters are type-certificated under U.S. Federal Aviation Regulations.

Basic empty weight of the UH-1B is 4,502 pounds (2,026 kilograms). Maximum takeoff weight is 8,500 pounds (3,825 kilograms). Maximum speed is 120 knots (222 kilometers per hour). Hovering ceiling out of ground effect is 12,500 feet.♦

Sources: *Jane's All the World's Aircraft* and Garlick Helicopters Inc.

said that he did not have enough rotor speed to cushion the landing.

“At the last moment, [the pilot] performed a cyclic flare to arrest his rate of descent and groundspeed,” said the accident report.

The passenger in the right-front seat, who held a private-pilot license with helicopter and single-engine airplane privileges issued by the FAA, in his witness statement, said, “Flying straight and level. Sudden loud bang, and aircraft jerked. [The pilot] reduced power, and we circled to the right for landing in a field. About 300 yards [273 meters] off landing site, [the pilot] rolled throttle off to keep [the] tail straight. And then we flared and landed.”

“The helicopter hit the ground hard enough to shatter the rear skids and spread the front skids,” said the report. The helicopter landed hard in a two-acre pasture next to the river.

Neither the pilot nor the passenger in the right-front seat of the helicopter was injured. The passenger in the left-rear seat suffered cracked vertebrae, said the report.

The report said that after the forced landing, the pilot shut off the engine, turned off the master electrical switch and the emergency locator transmitter (ELT), and disconnected the aircraft’s batteries. After getting out of the helicopter, he saw that the tail rotor and gearbox were missing from the vertical stabilizer. The pilot also saw that the right transmission-cowl door was missing and that the engine-cowl door was open.

Each of the two doors on the transmission cowl is secured by five latches, said the report. There are two latches in front of each door: two at the rear and one at the top. The top latch is shared by the two doors.

Investigators found that the rear-cowl latch blocks for the right door were missing from where they normally are installed to the forward engine fire wall. “There was no evidence of damage to the [fire wall], as would be seen if the blocks were torn off by the exiting door,” said the report. “It appears that the blocks were not installed at the time of the incident.

“The top latch, which is attached to the left transmission door and connects to a pin on the right transmission door, was found unlocked. This is a positive-locking latch and must be manually unlocked to open it. The latch handle had been previously bent, which prevented the locking button from dropping smoothly into place.

“With [the top and] aft latches unsecured, the only thing holding the [right] transmission door on the ship was the friction of the front two latches on their blocks,” said the report.

The door that separated from the transmission cowl was found buckled. “If the buckling was severe enough, the door would

have disengaged its front latch, allowing it to slam into the aft fuselage and tail boom,” said the report.

The investigation also disclosed that the engine-oil reservoir’s return-line fitting weld around the top of the tank was broken. The report said, “When the front cowl door left the aircraft at 100 knots, it may have damaged the oil-reservoir fitting, which was directly forward of the [fire wall].

“There were streaks of white-paint transfer along the tail boom leading directly to the tail rotor. One tail-rotor blade was struck by an object, probably the transmission-cowl [door], severing a two-inch section off the tip and the next six-inch to eight-inch section immediately inboard along the span of the blade.

“The tail-rotor pitch-change linkages are attached to a control beam called a crosshead. The crosshead was found disengaged from the pitch-change shaft. Once disengaged, the tail-rotor blades would have been able to move dynamically to a maximum (90-degrees-to-rotation) pitch angle. This probably occurred as a result of the blade’s impact with the cowl and is evidenced by the perpendicular bend and break lines of the remaining sections of both tail-rotor blades.”

The report said that an FAA inspector determined that a maintenance technician for Grizzly Mountain Aviation had reinstalled the transmission-cowl doors 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,” said the report.

“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 [in accordance with U.S. Federal Aviation Regulation Part 91] for ... ferry flight operations.

“The second mechanic, who had been on break [from work] 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 Aug. 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 Aug. 22, 1997, and the pilot signed off a pilot preflight [aircraft acceptance document] on Aug. 26, 1997.”

The pilot wrote, in the section of the NTSB accident report soliciting recommendations on how the accident could have been prevented, “Follow up on maintenance work.”

Based on its investigation, the NTSB concluded that the probable causes of the accident were “improper installation of the transmission door by a company mechanic, resulting in in-flight 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 record keeping by a company mechanic, and attainment of proper descent rate for the forced-landing touchdown was not possible,” said the NTSB. ♦

Editorial note: This article is based on information included in the U.S. National Transportation Safety Board’s factual report SEA97LA198. The 33-page report contains diagrams, black-and-white photographs and appendixes.

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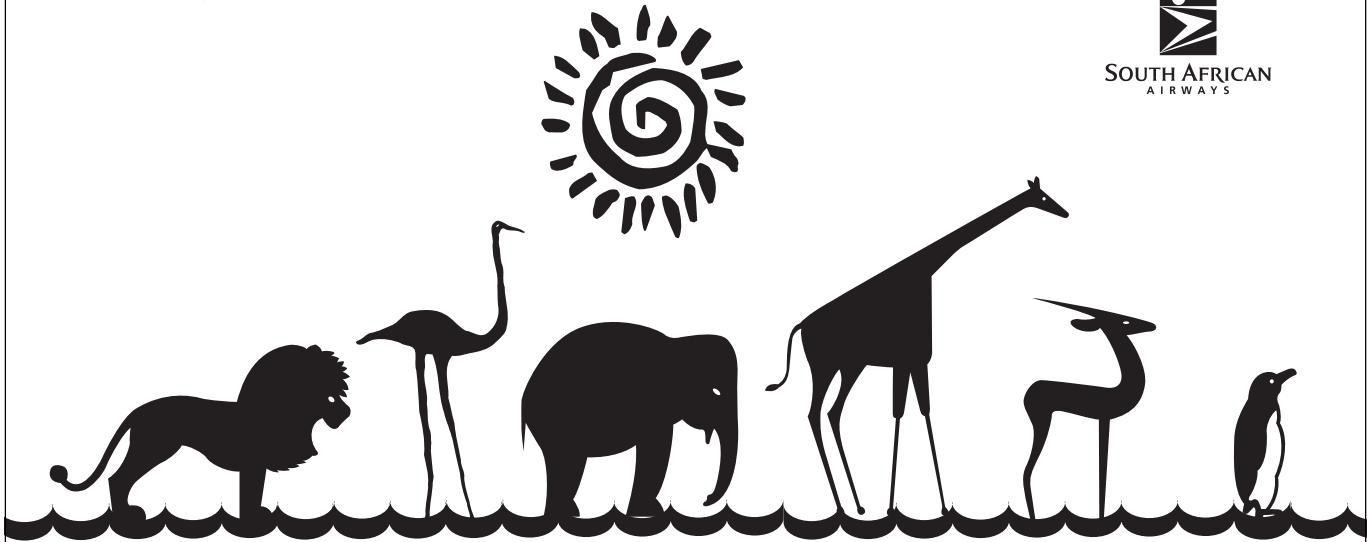
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