



National Transportation Safety Board Aviation Incident Final Report

Location:	GRAND CANYON PK, AZ	Incident Number:	LAX99IA085
Date & Time:	02/01/1999, 1010 MST	Registration:	N32GA
Aircraft:	Aerospatiale AS350B	Aircraft Damage:	Minor
Defining Event:		Injuries:	7 None
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled - Sightseeing		

Analysis

While descending on an aerial tour flight with six passengers, the left side bubble window separated from the helicopter and impacted a tail rotor blade. The pilot made a precautionary landing in the canyon without further incident. Neither the separated window nor its doorframe attachment seal (gasket) was recovered. Examination of the helicopter's tail rotor blade found it bent and scratched with areas of debonded material. The damaged blade was not repairable. During preflight inspection the pilot did not see any damage to the window, and during the flight the left seated passenger was not observed pressing on it. Due to observed cracks in the previous window 4.5 months and 589 flight hours earlier, it had been replaced with a window removed from another helicopter. No maintenance record entry was found for the window installation. The operator's replacement window was manufactured under a FAA Supplemental Type Certificate. The STC holder said that if its 'wedge' window is not properly installed, or if it becomes cracked or damaged due to exposure to harmful cleaning solvents, its integrity may be compromised. The operator reported that if a small crack existed near the window's edge, it may not have been noticed/reported by the pilot due to a lack of conspicuity. The reason(s) for the window separation could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: The in-flight separation of a side window for undetermined reasons.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: DESCENT - NORMAL

Findings

1. WINDOW, CABIN - SEPARATION
2. (C) REASON FOR OCCURRENCE UNDETERMINED

Factual Information

HISTORY OF FLIGHT

On February 1, 1999, about 1010 hours mountain standard time, an Aerospatiale AS350B, N32GA, operated by Silverado Helicopters, Inc., d.b.a. Heli USA, experienced the sudden loss of the entire left side passenger bubble window during descent over the Grand Canyon National Park, Arizona. The window impacted and damaged a tail rotor blade (paddle). Visual meteorological conditions prevailed during the on-demand sightseeing flight that was performed under 14 CFR Part 135. The commercial pilot landed without further mishap near the south side of the Colorado River in Arizona, about 2 miles from the Grand Canyon West Airport. The airplane sustained minor damage; neither the commercial pilot nor the six passengers were injured. The aerial tour flight originated from Las Vegas, Nevada, at 0928.

The pilot reported to the National Transportation Safety Board investigator that during his preflight inspection he had looked at the window and it did not appear damaged. Specifically, no abrasions, lacerations, cracks, or stop-drilled holes were observed. During the flight the passenger seated next to the window was not observed taking pictures or "elbowing" the window.

HELICOPTER INFORMATION

The operator reported that the previous left side bubble window had been observed cracked during a 5,000-hour inspection of the helicopter. The cracked window was removed, and it was replaced with a window that had been removed from another of the operator's helicopters, N122AS, which had a total airframe time of about 5,527 hours. This work was completed on August 21, 1998. No maintenance record entry was made for the replacement window's installation in N32GA, which had about 9,154.0 hours recorded on its airframe.

The operator reported it believes the replacement window that separated from the helicopter was not manufactured by Aerospatiale. The operator indicated to the Safety Board investigator that the window was obtained from Aeronautical Accessories, Inc., which holds a Supplemental Type Certificate for the "Wedge Window, 7 place" part number 350-903-001.

WRECKAGE AND IMPACT INFORMATION

The operator sent the damaged tail rotor blade to American Eurocopter for evaluation and possible repair. Following a damage assessment review by Eurocopter France, the Quality Assurance Department of American Eurocopter's USA facility reported to the Safety Board investigator that the blade was found with a debonded area located about 295 mm inboard from the tip of the blade's upper surface. In the debonded area, a 0.43 mm deep score mark was also observed in the skin of the blade. In addition, the straightness of the blade was measured, and it was found out of tolerance. Eurocopter reported that the blade was not repairable, and it should be scrapped.

TESTS AND RESEARCH

According to written and verbal information provided to the Safety Board investigator by management at Aeronautical Accessories, Inc., it manufactures a wedge window under STC Number SRO0183AT, which the operator may have utilized in its helicopter. The manufacturer provides specific instructions for the installation of its windows. In pertinent part, the manufacturer indicates that the window is properly installed in the helicopter's doorframe

from the inside of the door using a rubber seal (gasket) to hold it in place. It should not be installed from the outside. Application of excessive pressure on the window assembly or pulling the string too fast may cause damage to the rubber seal assembly.

The manufacturer also reported that if the printed installation instructions are not followed, it is possible to install the window backwards. If installed backwards, the window can be displaced upon application of pressure. A window that has been properly installed, and is undamaged, will last indefinitely if maintained without using harmful solvents.

The manufacturer additionally indicated that the window's design has not been changed since it was originally certified in November 1991. The window's overall size is larger than the opening in the door. If pressure is applied to the window, it would likely break prior to displacing the amount of material in the overlap area. The manufacturer indicated it has not received information regarding any previous in-flight separations.

The helicopter operator's assistant director of operations verbally indicated to the Safety Board investigator that in the Nevada heat, cracks might develop in windows. A small crack located near the window's edge may not have been noticed/reported by the pilot due to a lack of conspicuity, or for other reasons.

ADDITIONAL INFORMATION

The operator did not report the circumstances of the mishap to the Federal Aviation Administration or to the Safety Board until several days after the helicopter had been returned to service and a replacement tail rotor blade installed. The window and its associated retention gasket (seal) remain missing.

The passengers who had been onboard during the incident flight were not interviewed by the Safety Board investigator because the operator did not identify them.

The Safety Board investigator requested that the pilot provide a written statement regarding the conditions and circumstances of the mishap flight. An additional request was made to the operator for completion of the accident report form. The pilot's statement and a partially completed accident report form was received on November 22, 1999.

Pilot Information

Certificate:	Commercial	Age:	46, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
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:	07/29/1998
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	781 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aerospatiale	Registration:	N32GA
Model/Series:	AS350B AS350B	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	1188
Landing Gear Type:	Skid	Seats:	7
Date/Type of Last Inspection:	08/21/1998, Annual	Certified Max Gross Wt.:	4300 lbs
Time Since Last Inspection:	589 Hours	Engines:	1 Turbo Shaft
Airframe Total Time:	9743 Hours	Engine Manufacturer:	Turbomeca
ELT:		Engine Model/Series:	ARRIEL 1B
Registered Owner:	JAN LEASING LLC	Rated Power:	529 hp
Operator:	SILVERADO HELICOPTERS, INC.	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:	HELI USA	Operator Designator Code:	S9HA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	IGM, 3449 ft msl	Distance from Accident Site:	45 Nautical Miles
Observation Time:	0954 MST	Direction from Accident Site:	175°
Lowest Cloud Condition:	Clear / 0 ft agl	Visibility	10 Miles
Lowest Ceiling:	None / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	340°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	2° C / -5° C
Precipitation and Obscuration:			
Departure Point:	LAS VEGAS, NV (LAS)	Type of Flight Plan Filed:	Company VFR
Destination:	GRAND CANYON, AZ (GCN)	Type of Clearance:	None
Departure Time:	0928 MST	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Minor
Passenger Injuries:	6 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	7 None	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC): WAYNE POLLACK **Report Date:** 01/18/2001

Additional Participating Persons: DICK WRIGHT; LAS VEGAS, NV

Publish Date:

Investigation Docket: NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at <http://dms.nts.gov/pubdms/>.

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).