Aviation Investigation Final Report

Location:	Darlington, Maryland	**Accident Number:**	ERA11LA428
Date & Time:	July 29, 2011, 16:30 Local	**Registration:**	N39SH
Aircraft:	Schweizer 269C	**Aircraft Damage:**	Substantial
Defining Event:	Ground resonance	**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

The pilot of the helicopter stated that he conducted a light touchdown on the helipad and reduced engine power and applied collective friction for cooldown, per the helicopter's checklist. About 1 minute after the touchdown, the helicopter began to vibrate violently. The pilot further reduced engine power, but the helicopter continued to vibrate until it fell apart. Before the day's flights, the pilot performed a preflight inspection of the helicopter, during which he visually inspected both forward and aft landing gear dampers and also squeezed them to confirm that they contained oil and were not leaking. He did not observe any anomalies during this inspection. The landing gear dampers were examined by the manufacturer after the accident, and during load testing three of the four dampers did not meet required specifications. The minority owner of the helicopter stated that, based on the helicopter's fuel consumption during the time since its last inspection, he believed that the helicopter was more than 50 hours overdue for a 100-hour inspection. He also stated that, on one occasion, he found the helicopter's Hobbs meter disconnected. The helicopter manufacturer's maintenance instructions state that, "Incorrect fluid levels, improper pressure or inoperable valving will deteriorate the damping capabilities of the landing gear dampers. These conditions may result in ground resonance and destruction of the helicopter."

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Inadequate maintenance of the helicopter's landing gear dampers, which resulted in a main rotor out-of-balance condition and ground resonance encounter.

Findings

Aircraft	(general) - Not serviced/maintained
Personnel issues	Scheduled/routine maintenance - Owner/builder
Aircraft	Main landing gear - Not serviced/maintained

Factual Information

History of Flight

Standing-engine(s) operating	Ground resonance (Defining event)

On July 29, 2011, about 1630 eastern daylight time, a Schweizer 269C helicopter, N39SH, sustained substantial damage during a ground resonance encounter at a private helipad near Darlington, Maryland. The certificated commercial pilot sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the business flight, which departed from the Harford County Fairgrounds, Bel Air, Maryland, about 1600. The flight was operated under the provisions of Title 14 Code of Federal Regulations Part 91.

The pilot spent the day conducting helicopter rides at the local county fair. The purpose of the accident flight was to reposition the helicopter from the fairgrounds to the company's base of operations for the night. He stated that the flight from the fairgrounds was uneventful, and he conducted a visual approach for landing to a field adjacent to the helipad, then hover-taxied the helicopter to the pad. He stated that the touchdown on the helipad was light; he reduced the collective to the full down position, and applied collective friction for cool down per the helicopter checklist. The pilot reported that approximately one minute after touchdown, the helicopter began to vibrate violently. He attempted to further reduce power, and the helicopter continued to vibrate until it fell apart.

The pilot held a commercial pilot certificate with ratings for airplane single-engine land and rotorcraft-helicopter, as well as a flight instructor certificate with ratings for helicopter and instrument helicopter. He reported 968 hours total flight experience, of which 541 hours were in the accident helicopter make and model. His most recent flight review was conducted in February, 2011 in a Schweizer 300C helicopter. His most recent Federal Aviation Administration (FAA) second-class medical certificate was issued in April, 2011.

Review of FAA records revealed that the helicopter was manufactured in 1987, and was registered to the operator in August 2010. The helicopter was equipped with a single reciprocating, 190 hp Lycoming HIO-360 engine. Its most recent annual/100-hour inspection as denoted in the helicopter's maintenance logbook was completed in accordance with the Schweizer Helicopter Maintenance Instructions (HMI) on August 4, 2010, at a total aircraft time of 2907.2 hours.

The helicopter's landing gear consisted of forward and aft crossbeams and left and right stabilizers, attached through four skid struts, with four corresponding landing gear dampers attached to the struts. The oleo-type dampers served to absorb vertical shock to the landing gear during landings. The pilot stated that, prior to the day's flights, he performed a preflight inspection of the helicopter, during which he visually inspected both front and rear landing gear

dampers and also squeezed them to confirm that they contained oil and were not leaking. The pilot stated that he did not note any discrepancies during the preflight inspection.

According to the HMI, during the daily preflight inspection, the helicopter was to be inspected with fuel tank(s) full, and the stance of the helicopter was to be observed. If the helicopter was in a nose-down or unusually nose-up stance, the dampers were to be examined for proper extension. The HMI also stated that the landing gear dampers were to be examined for operation, condition, and extension at each 100-hour inspection. Overhaul of the dampers was required only when the dampers failed to meet the prescribed limitations of the HMI. Review of the helicopter's maintenance logs dating to January 2009 did not specifically indicate that any maintenance or overhaul had been performed to the landing gear dampers.

In a conversation with an FAA inspector subsequent to the accident, the minority owner of the helicopter stated that he was concerned about the maintenance being performed on the helicopter, and believed that it was overdue for mandatory inspections. When he confronted the majority owner, he was informed that the maintenance was "being taken care of." The minority owner also stated that on one occasion, he discovered that the helicopter's Hobbs meter was disconnected while the helicopter was being operated. Additionally, the minority owner had a 1,200-gallon fuel tank which was used to fill the accident helicopter exclusively. Based on the helicopter's consumption of fuel from this tank, as well as fuel receipts collected from local airports, the minority owner believed that the helicopter had accrued over 150 hours since its most recent 100-hour/annual inspection.

The main rotor dampers and landing gear dampers were removed from the helicopter and examined at Schweizer Aircraft Corp., Horseheads, New York, on September 20, 2011 with a Federal Aviation Administration (FAA) inspector present. The main rotor dampers were visually inspected. All displayed similar fractures of the attaching clevis turnbuckle rod consistent with static overload failure.

The four landing gear dampers were visually inspected and tested for compression load versus stroke length. Dampers are considered acceptable when the full compression point falls between the appropriate load "maximum" and "minimum" values. This "bottoming" must occur between 2,900 lbs - 3,600 lbs for forward dampers; and 3,200 lbs - 3,900 lbs for aft dampers.

During the test, it was determined that the forward left damper was within specifications, while the forward right damper was below the specified range by approximately 125 lbs. Neither aft landing gear damper met the required specifications.

The helicopter's Rotorcraft Flight Manual contained a warning which read, "Ground resonance may result if the helicopter is operated when the landing gear dampers are not in good operating condition."
The HMI further warned, "Incorrect fluid levels, improper pressure or inoperable valving will deteriorate the damping capabilities of the landing gear dampers. These conditions may result

in ground resonance and destruction of the helicopter. Follow all instructions in the HMI carefully, to ensure safe helicopter operation."

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	35,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter; Instrument helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	April 13, 2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 12, 2011
Flight Time:	968 hours (Total, all aircraft), 541 hours (Total, this make and model), 817 hours (Pilot In Command, all aircraft), 47 hours (Last 90 days, all aircraft), 29 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Schweizer	**Registration:**	N39SH
Model/Series:	269C	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	S1287
Landing Gear Type:	Skid	**Seats:**	3
Date/Type of Last Inspection:	August 4, 2010 Annual	**Certified Max Gross Wt.:**	2050 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2907 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	Installed, not activated	**Engine Model/Series:**	HIO-360 SER
Registered Owner:	Irvin Smith III	**Rated Power:**	205 Horsepower
Operator:	CVC Helicopter Service	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Dawn
Observation Facility, Elevation:	MTN,24 ft msl	**Distance from Accident Site:**	20 Nautical Miles
Observation Time:	17:55 Local	**Direction from Accident Site:**	204°
Lowest Cloud Condition:	Few / 8000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	230°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.82 inches Hg	**Temperature/Dew Point:**	38°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Bel Air, MD (NA)	**Type of Flight Plan Filed:**	None
Destination:	Darlington, MD (NA)	**Type of Clearance:**	None
Departure Time:	16:00 Local	**Type of Airspace:**	

Airport Information

Airport:	Private Heliport	**Runway Surface Type:**	
Airport Elevation:	395 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	39.65139,-76.236946(est)

Administrative Information

Investigator In Charge (IIC):	Alleyne, Eric
Additional Participating Persons:	Anthony Serio; FAA/FSDO; Baltimore, MD Steven Gleason; Schweizer Aircraft Corp; Horseheads, NY
Original Publish Date:	August 29, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=81287