



# Aviation Investigation Final Report

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<b>Location:</b>	Concord, California	<b>Accident Number:</b>	LAX02LA228
<b>Date &amp; Time:</b>	July 15, 2002, 14:57 Local	<b>Registration:</b>	N20256
<b>Aircraft:</b>	Schweizer 269C-1	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>		<b>Injuries:</b>	2 None
<b>Flight Conducted Under:</b>	Part 91: General aviation - Instructional		

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## Analysis

The helicopter sustained an in-flight fracture and separation of the center aft mast support tube. While en route to the practice area, a slight vibration was felt through the airframe. Moments later, the vibration level became severe. The certified flight instructor (CFI) entered an autorotation, and during the descent, he looked back and found the tail rotor was disabled. The autorotation was completed to a field. Post accident metallurgical examination revealed a fracture surface consistent with fatigue.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The main rotor mast support tube failure as a result of fatigue.

## Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION

Phase of Operation: CRUISE - NORMAL

### Findings

1. (C) ROTOR DRIVE SYSTEM,MAIN ROTOR MAST(DRIVE SHAFT) - CORRODED
2. (C) ROTOR DRIVE SYSTEM,MAIN ROTOR MAST(DRIVE SHAFT) - FATIGUE

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Occurrence #2: FORCED LANDING

Phase of Operation: EMERGENCY DESCENT/LANDING

### Findings

3. AUTOROTATION - PERFORMED - PILOT IN COMMAND(CFI)

## Factual Information

On July 15, 2002, at 1457 Pacific daylight time, a Schweizer 269C-1, N20256, sustained an in-flight fracture and separation of the center aft mast support tube about 10 miles east of Concord, California. The certified flight instructor (CFI) and the dual primary student were not injured; the helicopter sustained substantial damage. The helicopter was owned and operated by Helicopter Adventures, Inc., for a local area dual instructional flight under the provisions of 14 CFR Part 91. Visual meteorological conditions prevailed and no flight plan had been filed.

In a written statement, the flight instructor reported that they were in level cruise flight en route to the practice area when a slight but unusual vibration was felt through the airframe. As he was reaching for the controls, the vibration level suddenly became severe. The left door departed the helicopter and the flight instructor entered an autorotation. During the descent, he looked back and found the tail rotor was disabled. The autorotation was completed to a field.

A Federal Aviation Administration (FAA) airworthiness inspector examined the helicopter. He observed that the aft center mast support tube (p/n 269A2172-5) had fractured. He noted that a dark corrosion like appearance was present over a large part of the center of the fracture face. The part was painted with an epoxy coating and the inspector opined that this would have hindered visual detection of any crack in the underlying metal. He also reported that the tail rotor drive shaft had separated just aft of the oil cooler, and stated his belief that this was a secondary event to the vibration.

The main rotor mast support tube was sent to the National Transportation Safety Board Materials Laboratory Division, Washington, D.C., for examination. The complete metallurgical examination report is in the docket for this accident. The examination revealed a fracture surface, relatively smooth and flat, in a plane perpendicular to the longitudinal axis. A region of the fracture had a reddish brown corrosion layer with smooth curving boundaries; a feature consistent with fatigue. Closer examination using scanning electron microscopy (SEM) of the fracture surface origin area, revealed three crack arrest lines and further corrosion. Scratches were also observed on the left side of the aft support tube in the paint at the lower edge and near the origin of the fracture surface.

## Flight instructor Information

<b>Certificate:</b>	Commercial; Flight instructor	<b>Age:</b>	23, Male
<b>Airplane Rating(s):</b>	None	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Helicopter	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Helicopter	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Valid Medical-w/ waivers/lim	<b>Last FAA Medical Exam:</b>	March 15, 2002
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	March 16, 2002
<b>Flight Time:</b>	470 hours (Total, all aircraft), 420 hours (Total, this make and model), 407 hours (Pilot In Command, all aircraft), 200 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

## Student pilot Information

<b>Certificate:</b>	None	<b>Age:</b>	Male
<b>Airplane Rating(s):</b>	None	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	None None	<b>Last FAA Medical Exam:</b>	
<b>Occupational Pilot:</b>	UNK	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	19 hours (Total, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Schweizer	<b>Registration:</b>	N20256
<b>Model/Series:</b>	269C-1	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	0099
<b>Landing Gear Type:</b>	Skid	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	June 19, 2002 100 hour	<b>Certified Max Gross Wt.:</b>	1750 lbs
<b>Time Since Last Inspection:</b>	19.9 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	1609.6 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Textron Lycoming
<b>ELT:</b>	Not installed	<b>Engine Model/Series:</b>	HO-360-CIA
<b>Registered Owner:</b>	Helicopter Adventures, Inc.	<b>Rated Power:</b>	180 Horsepower
<b>Operator:</b>		<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	CCR,26 ft msl	<b>Distance from Accident Site:</b>	10 Nautical Miles
<b>Observation Time:</b>	14:53 Local	<b>Direction from Accident Site:</b>	250°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	15 knots / 0 knots	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	200°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.9 inches Hg	<b>Temperature/Dew Point:</b>	24°C / 0°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Concord, CA (CCR)	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Concord, CA (CCR)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	14:30 Local	<b>Type of Airspace:</b>	Class G

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 None	<b>Latitude, Longitude:</b>	37.989723,-122.056945

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Rich, Jeff
<b>Additional Participating Persons:</b>	Harry Carnahan; Federal Aviation Administration; Oakland, CA Kai Barkhald; Helicopter Adventures, Inc.; Concord, CA Steven Gleason; Schweizer Aircraft Corp.; Horseheads, NY
<b>Original Publish Date:</b>	March 2, 2004
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=55217">https://data.nts.gov/Docket?ProjectID=55217</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).