Aviation Investigation Final Report

Location:	EL CAJON, California	**Accident Number:**	LAX01LA009
Date & Time:	October 3, 2000, 14:30 Local	**Registration:**	N189ND
Aircraft:	Aerospatiale AS350BA	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

While positioning the helicopter from the ground to a storage cart, the pilot lost directional, made a hard landing, and the tail boom struck the ground. Prior to the loss of directional control, the pilot saw something depart the tail section. He attributed the loss of directional control to a tail rotor failure. He initiated an autorotation over the landing cart. He maneuvered away from the cart in order to land on the ground and prevent a partial landing on the cart. The on-scene investigation revealed the aft drive shaft coupling was detached from the tail rotor drive shaft. Three bolts retain the coupling. One bolt was found attached to the coupling, another bolt was found on the ground, and the third bolt, and two of the retaining nuts, were not located. Neither bolt exhibited stripped threads or deformation. The last maintenance performed on the helicopter was by the previous owner. A track and balance of the tail rotor system was performed about 48 flight hours prior to the accident. According to the manufacturer's maintenance instructions, the balancing is accomplished by placement of washers under the nuts that are used to secure the bolts that attach to the aft drive shaft coupling. These are the same nuts that were not located at the accident site. Maintenance instructions also specify that the bolts in this area should be checked for proper torque and safety after an inspection.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Improper torquing procedure of the aft tail rotor drive shaft coupling by maintenance personnel after tracking the tail rotor.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: LANDING

Findings
1. (C) MAINTENANCE,ANNUAL INSPECTION - IMPROPER - OTHER MAINTENANCE PERSONNEL
2. (F) ROTOR DRIVE SYSTEM,TAIL ROTOR DRIVE SHAFT COUPLING - DISCONNECTED

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

Findings
3. AUTOROTATION - INITIATED - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: LANDING

Findings
4. TERRAIN CONDITION - GROUND

Factual Information

On October 3, 2000, at 1430 hours Pacific daylight time, an Aerospatiale AS350BA, N189ND, made a hard landing after experiencing a loss of directional control at Gillespie Field Airport, El Cajon, California. Vortex Helicopters, LLC, operated the helicopter under the provisions of 14 CFR Part 91. The helicopter sustained substantial damage when the tail boom contacted the ground. The airline transport pilot and one passenger were not injured. Visual meteorological conditions prevailed for the positioning flight, and no flight plan had been filed.

The helicopter had been returned from another operator after 15 hours of training flights in which a series of full autorotations to the ground were conducted. The purpose of the accident flight was to reposition the helicopter from the ground onto a landing cart for storage. While over the landing cart, the pilot experienced difficulty maintaining directional control. He suspected an antitorque failure and initiated an autorotation. The pilot stated at the time the landing cart was partially beneath the helicopter. The pilot maneuvered away from the cart in order to land on the ground and prevent a partial landing on the cart. As he increased power to maneuver away from the cart, there was a further loss of directional control. After clearing the landing cart, the subsequent hard landing resulted in the tail boom contacting the ground.

In an interview with a Federal Aviation Administration (FAA) inspector, the pilot stated that while he was attempting to land on the cart, he saw something fly off the helicopter prior to losing directional control.

During the on-scene investigation conducted by the FAA inspector, the aft tail rotor drive shaft coupling was found remotely located from the main wreckage. The FAA inspector noted that three bolts retain the coupling. One bolt was found attached to the coupling with no nut. He stated that there was no evidence of the nut having stripped the bolt. The second bolt was found on the ground with the threads intact. He was not able to find the third bolt or the other two nuts.

The FAA inspector reviewed the maintenance logbooks and noted the University of North Dakota, Grand Forks, North Dakota, performed the last annual on March 9, 2000. The University of North Dakota performed a track and balance inspection on the tail rotor system about 48 hours prior to the accident. According to maintenance instructions provided by the manufacturer, the balancing is accomplished by placing washers under the nuts used to secure the bolts that attach to the aft drive shaft coupling. These were the same nuts that were not located at the scene of the accident. A caution to the maintenance instructions specifies that the bolts in this area should be checked for proper torque and safety after an inspection.

The FAA San Diego, California, Flight Standards District Office reported the accident to the

Safety Board on October 12, 2000.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	50,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	June 2, 2000
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	4000 hours (Total, all aircraft), 75 hours (Total, this make and model), 4000 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aerospatiale	**Registration:**	N189ND
Model/Series:	AS350BA AS350BA	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2152
Landing Gear Type:	Skid	**Seats:**	6
Date/Type of Last Inspection:	March 2, 2000 Annual	**Certified Max Gross Wt.:**	4630 lbs
Time Since Last Inspection:	73 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	5764 Hrs	**Engine Manufacturer:**	Turbomeca
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	ARRIEL 1B
Registered Owner:	VORTEX HELICOPTERS, LLC	**Rated Power:**	510 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SEE ,387 ft msl	**Distance from Accident Site:**	
Observation Time:	14:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 1500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 2200 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	68°C / 61°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(SEE)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	14:30 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	GILLESPIE FIELD AIRPORT SEE	**Runway Surface Type:**	Concrete
Airport Elevation:	387 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	32.789264,-116.95919(est)

Administrative Information

Investigator In Charge (IIC):	Cornejo, Tealeye
Additional Participating Persons:	GREG NOLTING; SAN DIEGO , CA
Original Publish Date:	November 6, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=51220