Aviation Investigation Final Report

Location:	San Diego, California	**Accident Number:**	LAX01TA092
Date & Time:	February 21, 2001, 11:13 Local	**Registration:**	N606BP
Aircraft:	McDonnell Douglas 600N	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

During the landing slide, the main rotor blew back, contacted the tail boom, and severed it. The flight purpose was refresher training and the specific maneuver at the time of the accident was training in the procedure for a stuck (fixed) right pedal. According to the flight crew, there were no mechanical discrepancies with the helicopter. A run-on landing with the fixed right pedal was made to the 260-degree taxiway. The wind reported at the airport about 14 minutes after the accident was 330 degrees at 6 knots. The pilots reported that the wind was 310 degrees at 6 to 8 knots with gusts to 12 knots. According to information provided by the flight crew, the training pilot accomplished the maneuver: aligned with the runway heading with an airspeed between 55-65 knots; the instructor pilot (IP) held right pedal to induce a 10-degree right yaw; touchdown was estimated to occur about 30-40 knots; the low rotor rpm horn was "on" at or near touchdown, but the rotor speed was not noted; the collective was positioned at some point above half travel; cyclic was slightly forward of neutral; shortly after touchdown both pilots felt the main rotor strike the tail boom; directional control was lost and the helicopter rotated about 220 degrees nose right before coming to rest, upright. The manufacturer indicated that main rotor/tail boom contact from blowback of the main rotor may result from forward velocity and low/decaying main rotor rpm (advance ratio) due to a high collective position during the ground run-out phase following the 30-knot plus touchdown. The blowback condition is exacerbated by the high angle pitch setting which causes blade stall over a large portion of the rotor disk. A blowback condition is present in all helicopters. It may be more pronounced in the MD600N (versus the 500N) due to greater helicopter gross weight, reduced flare/deceleration capabilities because of tail boom length and installation angle, and the increased surface of the additional main rotor blade resulting in a more rapid decay of main rotor rpm. A caution in the helicopter's Rotorcraft Flight Manual specifies for practice autorotation landings to avoid conditions of ROTOR RPM (Nr) less than 60 percent with headwinds across the rotor greater than 30 knots during touchdown autorotations. These conditions during touchdown and subsequent ground slide, can lead to excessive rotor blowback, reduction in blade tip to tail boom clearance, and subsequent damage to the

aircraft. Avoid these conditions by reducing collective pitch after touchdown (surface conditions permitting) and minimizing ground run.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The student pilot's improper use of the rotorcraft flight controls, and the instructor pilot's inadequate supervision of the maneuver.

Findings

Occurrence #1: MISCELLANEOUS/OTHER
Phase of Operation: LANDING

Findings
1. MISC ROTORCRAFT,TAIL BOOM - CUT/SEVERED
2. (C) ROTORCRAFT FLIGHT CONTROLS - IMPROPER USE OF - PILOT IN COMMAND
3. (F) SUPERVISION - INADEQUATE - CHECK PILOT

Factual Information

On February 21, 2001, about 1113 hours Pacific standard time, a McDonnell Douglas 600N (helicopter), N606BP, operated by the U.S. Border Patrol, severed its tail boom during landing on taxiway A at Brown Field, San Diego, California. Visual meteorological conditions prevailed, and a company flight plan was filed for the public-use instructional flight. The helicopter was substantially damaged. Neither of the airline transport certificated pilots were injured. The flight was performed under 14 CFR Part 91, and originated from the airport about 1045.

The flight purpose was refresher training, and the specific maneuver at the time of the accident was training in the procedure for a stuck (fixed) right pedal. According to the flight crew there were no mechanical discrepancies with the helicopter. A run-on landing with the fixed right pedal was made to the 260-degree taxiway. The wind reported at the airport about 14 minutes after the accident was 330 degrees at 6 knots. The pilots reported that the wind was 310 degrees at 6 to 8 knots with gusts to 12 knots.

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minimizing ground run.

Pilot Information

Certificate:	Airline transport; Flight engineer	**Age:**	41,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	September 14, 2000
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	December 6, 2000
Flight Time:	4740 hours (Total, all aircraft), 277 hours (Total, this make and model), 3000 hours (Pilot In Command, all aircraft), 100 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Check pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	54,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Helicopter; Instrument airplane; Instrument helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	January 3, 2001
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 20, 2000
Flight Time:	12120 hours (Total, all aircraft), 608 hours (Total, this make and model), 12050 hours (Pilot In Command, all aircraft), 94 hours (Last 90 days, all aircraft), 28 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	McDonnell Douglas	**Registration:**	N606BP
Model/Series:	600N	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	RN-035
Landing Gear Type:	Skid	**Seats:**	6
Date/Type of Last Inspection:	January 16, 2001 100 hour	**Certified Max Gross Wt.:**	4100 lbs
Time Since Last Inspection:	95.4 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	795.4 Hrs at time of accident	**Engine Manufacturer:**	Allison
ELT:	Installed, not activated	**Engine Model/Series:**	250-C47M
Registered Owner:	U.S. Border Patrol	**Rated Power:**	808 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SDM,526 ft msl	**Distance from Accident Site:**	
Observation Time:	11:27 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.22 inches Hg	**Temperature/Dew Point:**	17°C / 7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	SAN DIEGO, CA (SDM)	**Type of Flight Plan Filed:**	Company VFR
Destination:	San Diego, CA (SDM)	**Type of Clearance:**	VFR
Departure Time:	10:30 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	BROWN FIELD MUNI SDM	**Runway Surface Type:**	Asphalt
Airport Elevation:	526 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	26L	**IFR Approach:**	None
Runway Length/Width:	3057 ft / 50 ft	**VFR Approach/Landing:**	Full stop;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	32.572223,-116.980278

Administrative Information

Investigator In Charge (IIC):	Baily, Frank
Additional Participating Persons:	Don Scarfone; FAA WP-FSDO ; San Diego, CA
Original Publish Date:	January 23, 2002
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=51805