Aviation Investigation Final Report

Location:	Beaumont, Texas	**Accident Number:**	GAA16LA117
Date & Time:	January 30, 2016, 10:00 Local	**Registration:**	N503DS
Aircraft:	HELICOPTERES GUIMBAL CABRI	**Aircraft Damage:**	Substantial
Defining Event:	Loss of tail rotor effectiveness	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

According to the private pilot, after completing a local area flight, he was hover-taxiing the helicopter to the ramp on about a 065-degree heading. Once the helicopter was clear of the taxiway, the helicopter encountered a small wind gust, which the pilot classified as a "tailwind." He corrected the helicopter's subsequent left rotation by applying about one-quarter of right tail rotor pedal and noted that the airspeed was about 20 knots and the altitude was about 10 ft.

About 1 second later, the helicopter encountered another more significant wind gust. The pilot noted that he applied full right tail rotor pedal but that the helicopter continued to rotate left and that he then "nudged" the cyclic to the right to "follow the left spin out" and regain control. The pilot was able to stop the forward momentum of the helicopter; however, the left skid contacted the ground, and the helicopter rolled left and impacted terrain.

The pilot reported that there were no preimpact mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation and that he considered this a loss of tail rotor effectiveness event. The pilot reported that the wind at the airport at the time of the accident was from 220 degrees at 14 knots gusting to 24 knots. It is likely that the pilot did not maintain a nose-into-the-wind position and that, when the helicopter began to settle with power, it lost tail rotor effectiveness.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's inadequate compensation for wind during a hover-taxi and his failure to maintain helicopter control due to a loss of tail rotor effectiveness.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Prop/rotor parameters - Capability exceeded
Environmental issues	Gusts - Response/compensation
Environmental issues	Tailwind - Response/compensation

Factual Information

History of Flight

Maneuvering-hover	Other weather encounter
Maneuvering-hover	Attempted remediation/recovery
Maneuvering-hover	Loss of tail rotor effectiveness (Defining event)
Maneuvering-hover	Loss of control in flight
Maneuvering-hover	Collision with terr/obj (non-CFIT)

On January 30, 2016, about 1000 central standard time, a Helicopteres Guimbal Cabri G2 helicopter, N503DS, collided with terrain during a hover taxi at the Beaumont Municipal Airport (BMT), Beaumont, Texas. The private pilot and sole passenger sustained no injury and the helicopter sustained substantial damage. The helicopter was registered to 503 Delta Sierra, LLC, and operated by Neches Helicopter Training, LLC as a day, visual flight rules (VFR) flight under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed and no flight plan was filed. The flight originated from the Beaumont Municipal Airport (BMT), about 0830.

According to the pilot, after the completion of a local area flight he was hover taxiing to the ramp on about a 065 degree heading to terminate the flight. Once the helicopter was clear of the taxiway, the helicopter encountered a small gust of wind which the pilot classified as a tail wind. He reported that he corrected the left rotation of the helicopter with about one quarter of right tail rotor pedal and noted that his airspeed was about 20 knots and his altitude was about 10 feet.

The pilot reported that about one second later, he encountered a second gust of wind much greater than the first gust of wind. The pilot applied full right tail rotor pedal, the helicopter continued to rotate to the left, and he "nudged" the cyclic to the right to "follow the left spin out" and regain control. The pilot was able to stop the forward momentum of the helicopter however the left skid made contact with the ground and the helicopter rolled to the left and impacted terrain. The pilot reported that during this sequence, the helicopter rotated to the left twice terminating at about his original hover taxi heading. He further reported that he considers this a loss of tail rotor effectiveness (LTE) event. The helicopter sustained substantial damage to the fuselage, the main rotor system, the tailboom, and the tail rotor system.

The pilot reported that the wind condition at the airport at the time of the accident was 14 knots gusting to 24 knots from 220 degrees.

The pilot verified that there were no preimpact mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.

ADDITIONAL INFORMATION

Helicopteres Guimbal Cabri G2 Flight Testing

The manufacturer reported that the helicopter was tested to wind conditions higher than the required 17 knots and found to be without LTE. The Cabri G2 Flight Manual states that a wind speed of 35 knots at all headings was demonstrated at sea level and that a wind speed of 25 knots at all headings was demonstrated at the maximum reduced weight for in ground effect hover performance.

Helicopteres Guimbal Cabri G2 Service Letter SL 12-001 Yaw Control in Approach

The manufacturer has published a service letter addressing yaw control. This service letter states in part:

Extensive flight testing of the Cabri G2 and of other helicopters equipped with a Fenestron have shown that such tail rotor, combining a large shroud and a relatively high disk loading, is immune to stall and to vortex-ring state commonly referred to as LTE (Loss of Tail Rotor Efficiency).

The service letter also provides guidance with yaw control and states in part:

Never wait to correct a sideslip – and particularly to the left – when approaching for a standard landing (30-60 knot approach). Use adequate pedal input without any hesitation. If there is a known cross wind, and particularly from the right hand, pay even more attention to keep the helicopter centerline aligned with the path and be prepared to do large pedals input.

Never hesitate to apply full right pedal to correct a yawing to the left before it gets faster. Keep the pedal to its stop, until the rotation stops completely.

When practicing spot-turns at low height above the ground, always do it "on the power pedal" – to the right in the Cabri G2 case. Then raising the collective in case of problem will stop the spin.

Helicopteres Guimbal Cabri G2 Prolonged Yawing Fuel Sloshing

On October 26, 2011 in Gloucestershire, United Kingdom, a Helicopteres Guimbal Cabri G2 sustained substantial damage when the pilot lost yaw control while landing, the engine lost power, and the helicopter landed hard. The Air Accidents Investigation Branch report (EW/G2011/10/16) states in part:

The pilot stated that he believed that "slow application of right yaw pedal" was the cause of the accident. The manufacturer also believes that prolonged yawing can cause the engine to stop through fuel sloshing. It is understood that no preimpact mechanical anomalies were found after inspection.

Loss of Tail Rotor Effectiveness

The Federal Aviation Administration has published the Helicopter Flying Handbook FAA-H-8083-21A (2012).This handbook discusses loss of tail rotor effectiveness and states in part:

Loss of tail rotor effectiveness (LTE) or an unanticipated yaw is defined as an uncommanded, rapid yaw towards the advancing blade which does not subside of its own accord. It can result in the loss of the aircraft if left unchecked. It is very important for pilots to understand that LTE is caused by an aerodynamic interaction between the main rotor and tail rotor and not caused from a mechanical failure. Some helicopter types are more likely to encounter LTE due to the normal certification thrust produced by having a tail rotor that, although meeting certification standards, is not always able to produce the additional thrust demanded by the pilot.

LTE is an aerodynamic condition and is the result of a control margin deficiency in the tail rotor. It can affect all single rotor helicopters that utilize a tail rotor of some design. The design of main and tail rotor blades and the tail boom assembly can affect the characteristics and susceptibility of LTE but will not nullify the phenomenon entirely.

Pilot Information

Certificate:	Private	**Age:**	35,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	January 12, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	September 12, 2015
Flight Time:	(Estimated) 62 hours (Total, all aircraft), 22 hours (Total, this make and model), 24 hours (Pilot In Command, all aircraft), 3 hours (Last 90 days, all aircraft), 1 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		**Age:**	Male
Airplane Rating(s):		**Seat Occupied:**	Left
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	HELICOPTERES GUIMBAL	**Registration:**	N503DS
Model/Series:	CABRI G2	**Aircraft Category:**	Helicopter
Year of Manufacture:	2015	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1099
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	October 6, 2015 Annual	**Certified Max Gross Wt.:**	1543 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	69.7 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	C126 installed, not activated	**Engine Model/Series:**	O-360-J2A
Registered Owner:	On file	**Rated Power:**	145 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KBMT,33 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	15:55 Local	**Direction from Accident Site:**	256°
Lowest Cloud Condition:	Scattered / 3000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots / 16 knots	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.02 inches Hg	**Temperature/Dew Point:**	20°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Beaumont, TX (BMT)	**Type of Flight Plan Filed:**	None
Destination:	Beaumont, TX (BMT)	**Type of Clearance:**	None
Departure Time:	08:30 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	BEAUMONT MUNI BMT	**Runway Surface Type:**	Asphalt
Airport Elevation:	31 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	13	**IFR Approach:**	None
Runway Length/Width:	4001 ft / 75 ft	**VFR Approach/Landing:**	None

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:**	30.071388,-94.214164(est)

Administrative Information

Investigator In Charge (IIC):	Hodges, Michael
Additional Participating Persons:	Glen Longnion; FAA Houston FSDO; Houston, TX Frédéric Aime; Bureau d'Enquêtes et d'Analyses
Original Publish Date:	November 29, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=92675