Aviation Investigation Final Report

Location:	Salt Lake City, Utah	**Accident Number:**	WPR20LA029
Date & Time:	November 12, 2019, 20:08 Local	**Registration:**	N271HC
Aircraft:	Agusta A109	**Aircraft Damage:**	Substantial
Defining Event:	Inflight upset	**Injuries:**	3 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Discretionary)		

Analysis

The crew of the helicopter air ambulance flight departed to pick up a patient in night visual meteorological conditions. While en route to their destination, a flight nurse, who was seated in the left seat and communicating with ground personnel, inadvertently depressed the helicopter's left anti-torque pedal instead of the foot-activated push-to-talk (PTT) switch to activate the microphone. The helicopter suddenly yawed left about 11°, which the pilot immediately countered and restored straight-and-level flight. The helicopter sustained damage to the tail rotor blades and empennage that was not discovered until several hours later when the accident crew was relieved.

The damage to the blades and empennage was consistent with their making contact, and the flight data suggest this occurred during the first leg of the shift flight as the crew did not experience any other events that would have caused the degree of damage observed. Postaccident examination of the tail rotor gearbox and tail rotor blades did not reveal any anomalies. A performance analysis by the helicopter manufacturer showed that the amount of left pedal applied at the time of the pilot's yaw recovery exceeded the parameters tested during certification.

The flight nurse seated in the cockpit at the time of the accident normally sat in the rear cabin and was likely not as familiar with the location of the PTT, especially in nighttime lighting conditions.

Probable Cause and Findings

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

The flight nurse's inadvertent application of left anti-torque pedal during cruise flight, which resulted in a rapid yaw and pitch movement that caused the tail rotor blades to contact the tailboom.

Findings

Personnel issues	Incorrect action selection - Flight crew

Factual Information

History of Flight

Enroute	Inflight upset (Defining event)

On November 12, 2019, about 2008 mountain standard time, an AgustaWestland AW109SP helicopter, N271HC, was substantially damaged during cruise flight near Spanish Fork, Utah. The pilot and two flight nurses were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* (CFR) Part 135 air ambulance flight.

According to the pilot, the crew departed their base about 1952 and was bound for a motor vehicle accident about 22 minutes away. About 5 minutes from the destination, the flight nurse, seated in the left front seat, attempted to contact personnel on the ground to coordinate their landing. Rather than step on the push-to-talk (PTT) button located on the cabin floor to activate the radio microphone, he inadvertently stepped on the left anti-torque pedal, which resulted in a rapid yaw to the left. The pilot re-established straight and level flight and landed the helicopter uneventfully. The pilot did not observe any unusual signatures on the exterior of the helicopter during a walkaround inspection after they landed at their destination following the accident; however, he did not inspect the tail rotor blades or tailboom. The rest of the flight was uneventful, and the pilot did not report any anomalies with the tail rotor blades or tailboom during the subsequent flights that took place during his shift.

After the accident crew arrived at the company's home base and went off-duty, the oncoming pilot conducted a walkaround inspection in daylight conditions and discovered damage to the tailboom as he approached the helicopter. The helicopter was immediately taken out of service and ferried to the company's maintenance facility for repair.

The nurse who was seated in the left front seat during the accident flight normally rode in the rear cabin of the helicopter, but the crew decided that he would sit in the cockpit during the accident flight to make room for the patient they intended to pick up.

The tail rotor blades, tail rotor gearbox, pitch change slider assembly, and the tail rotor hub assembly were examined by the NTSB materials laboratory and the components exhibited no anomalies.

The helicopter was equipped with an Appareo flight data monitoring (FDM) system, which indicated that the yaw was about 11°. An NTSB performance study using data retrieved from the FDM corroborated the pilot's statement and showed that the helicopter rapidly turned left from a heading of 153° to 142° in 1.25 seconds. When the pilot countered the movement with right tail rotor pedal, the helicopter returned to 151° in 2 seconds. During this time, the helicopter rapidly rolled from level flight to -15° to 15° and pitched up 2° before returning to its original altitude.

The helicopter manufacturer provided flight handling qualities data obtained during the certification of the accident helicopter. A dynamic stability test point was performed in level flight at $0.9V_h \pm 10°$ yaw where V_h is the calculated maximum horizontal airspeed based on atmospheric conditions. This test involved a 15% pedal input over 0.5 second, which resulted in a 6°-to-15° per second sideslip deviation. A simulation was performed using the accident helicopter's parametric data and ambient conditions showed that to match the yaw rate and magnitude, a 40% left pedal input (90% pedal position) was required. This resulted in a 20° per second deviation, which exceeded the parameters tested for during certification.

Pilot Information

Certificate:	Airline transport	**Age:**	72,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	June 13, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	August 30, 2019
Flight Time:	11173 hours (Total, all aircraft), 985 hours (Total, this make and model), 10443 hours (Pilot In Command, all aircraft), 41 hours (Last 90 days, all aircraft), 33 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Agusta	**Registration:**	N271HC
Model/Series:	A109 SP	**Aircraft Category:**	Helicopter
Year of Manufacture:	2011	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	22250
Landing Gear Type:	Retractable -	**Seats:**	5
Date/Type of Last Inspection:	October 25, 2019	**Certified Max Gross Wt.:**	7000 lbs
Time Since Last Inspection:	3745 Hrs	**Engines:**	2 Turbo shaft
Airframe Total Time:	at time of accident	**Engine Manufacturer:**	Pratt and Whitney
ELT:	C126 installed, not activated	**Engine Model/Series:**	PW207
Registered Owner:	IHC Health Services Inc	**Rated Power:**	
Operator:	IHC Health Services Inc	**Operating Certificate(s) Held:**	Rotorcraft external load (133), On-demand air taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KPVU,4497 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	19:56 Local	**Direction from Accident Site:**	309°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.16 inches Hg	**Temperature/Dew Point:**	3°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Murray, UT (UT11)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Spanish Fork, UT	**Type of Clearance:**	None
Departure Time:	19:52 Local	**Type of Airspace:**	Class E

Wreckage and Impact Information

Crew Injuries:	3 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	40.170555,-111.644996(est)

Administrative Information

Investigator In Charge (IIC):	Stein, Stephen
Additional Participating Persons:	Christopher Lemieux; Leonardo Company; Philadelphia, PA Jeff Smith; Federal Aviation Administration; Salt Lake City, UT
Original Publish Date:	June 3, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=100590

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