Aviation Investigation Final Report

Location:	Iron Station, North Carolina	**Accident Number:**	ERA16LA301
Date & Time:	August 26, 2016, 14:50 Local	**Registration:**	N48KM
Aircraft:	MEANS ROBER C ROTORWAY EXEC	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Flight test		

Analysis

The private pilot said that, while in a hover during the fifth of a series of test flights, the experimental amateur-built helicopter pitched up and to the left and began transitioning rearward. He corrected with a full, right-forward cyclic input, yet the helicopter continued to transition to its rear until it struck a hangar. The helicopter continued inside the open hangar, collided with an airplane, and came to rest on its left side. The helicopter sustained substantial damage to the cockpit, fuselage, and tail boom. The pilot reported the helicopter had performed "flawlessly" prior to the loss of control.

Before the test flights, the helicopter was configured with a ballast weight located on the right skid as prescribed in the pilot operating handbook for solo operation. Following the accident, the forward section of the right main landing gear tube, with the counterweight ballast attached, was found between where the helicopter hovered for the test, and where it came to rest inside the hangar. The tube's fracture surface features were consistent with overstress, and no indications of preexisting cracking or corrosion were observed. Given the location of the separated skid tube after the accident, it is likely that the skid contacted the ground while hovering, which resulted in an overstress separation of the skid tube and attached counterweight. This subsequently resulted in a sudden center of gravity (CG) shift outside the normal operating CG range and a loss of control.

Probable Cause and Findings

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

The pilot's failure to maintain adequate clearance from the ground while hovering, which resulted in separation of the forward section of the right skid tube with counterweight attached, a sudden center of gravity (CG) shift outside the normal operating range, and a subsequent loss of control.

Findings

Aircraft	Altitude - Not attained/maintained
Aircraft	Aux gear (tail/rotorcrft skid) - Damaged/degraded
Aircraft	CG/weight distribution - Not specified

Factual Information

History of Flight

Maneuvering-hover	Low altitude operation/event
Maneuvering-hover	Loss of control in flight (Defining event)

On August 26, 2016, about 1450 eastern daylight time, an experimental amateur-built Rotorway Exec, N48KM, was substantially damaged following a loss of control while in hovering flight at Lincolnton-Lincoln County Regional Airport (IPJ), Iron Station, North Carolina. The private pilot sustained minor injuries. Visual meteorological conditions prevailed and no flight plan was filed for the local maintenance test flight which was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

According to the pilot, the purpose of the flight was to confirm the dynamic track and balance condition of the main rotor system following the replacement of elastomeric bearings in the main rotor hub. Four ground and hover tests had been performed previous to the accident flight.

In an interview with a Federal Aviation Administration (FAA) aviation safety inspector, the pilot said that while at a hover, the helicopter pitched up, to the left, and began transitioning rearward. He corrected with a full, right-forward cyclic input, yet the helicopter continued to transition to its rear until it struck a hangar. The helicopter continued inside the open hangar, collided with an airplane, and came to rest on its left side. The helicopter sustained substantial damage to the cockpit, fuselage, and tailboom.

Prior to the flights, the helicopter was configured with a ballast weight located on the right skid as prescribed in the pilot operating handbook (POH) for solo operation. Following the accident, the forward section of the right main landing gear tube, with counterweight ballast attached, was found between the positions of the helicopter where it hovered for the test, and where it came to rest.

Examination of the helicopter by FAA inspectors confirmed cyclic and collective control continuity. Additionally, the pilot reported that the helicopter had operated "flawlessly" up until the time of the accident.

The helicopter's most recent condition inspection was completed on July 22, 2016, at 254 total aircraft hours.

The pilot held a private pilot certificate with ratings for airplane single engine land and rotorcraft-helicopter. His most recent Federal Aviation Administration (FAA) third-class medical certificate was issued on March 14, 2016. He reported 600 total hours of flight experience, of which 500 were in the accident helicopter make and model.

Weather reported at the time of the accident included winds from 080 degrees at 4 knots, 10 statute miles visibility, clear skies, temperature 34 degrees C, dew point 17 degrees C, and an altimeter setting of 30.11 inches of mercury.

The forward section of the right main landing gear tube was forwarded to the NTSB Materials Laboratory in Washington, DC for examination. According to the Material Engineer's report, "The features on the fracture surface of the separated end were consistent with overstress. No indications of preexisting cracking or corrosion were observed."

Pilot Information

Certificate:	Private	**Age:**	56,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
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:**	March 14, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	600 hours (Total, all aircraft), 500 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	MEANS ROBER C	**Registration:**	N48KM
Model/Series:	ROTORWAY EXEC	**Aircraft Category:**	Helicopter
Year of Manufacture:	1989	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	3363
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	July 22, 2016 Condition	**Certified Max Gross Wt.:**	1500 lbs
Time Since Last Inspection:	1 Hrs	**Engines:**	Reciprocating
Airframe Total Time:	255 Hrs at time of accident	**Engine Manufacturer:**	Rotorway
ELT:	Not installed	**Engine Model/Series:**	152
Registered Owner:	On file	**Rated Power:**	150 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:	KIPJ,875 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	18:20 Local	**Direction from Accident Site:**	165°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.11 inches Hg	**Temperature/Dew Point:**	34°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Iron Station, NC (IPJ)	**Type of Flight Plan Filed:**	None
Destination:	Iron Station, NC (IPJ)	**Type of Clearance:**	None
Departure Time:	14:50 Local	**Type of Airspace:**	

Airport Information

Airport:	LINCOLNTON-LINCOLN COUNTY RGNL IPJ	**Runway Surface Type:**	Asphalt
Airport Elevation:	877 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	35.483333,-81.161109(est)

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Paul Meyer; FAA/FSDO; Charlotte, NC
Original Publish Date:	October 2, 2017
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=93903