



Aviation Investigation Final Report

Location:	Mineral Wells, Texas	Accident Number:	CEN23LA135
Date & Time:	March 14, 2023, 10:00 Local	Registration:	N314AL
Aircraft:	BELL HELICOPTER TEXTRON INC APT70	Aircraft Damage:	Substantial
Defining Event:	Collision during takeoff/land	Injuries:	1 None
Flight Conducted Under:	Part 91: General aviation - Flight test		

Analysis

During a flight test, the unmanned aircraft's flight control computer registered a low battery voltage reading and entered an automatic land in place flight maneuver. The aircraft was hovering over a large bush at the time and the ground station operator (GSO) attempted to override the system, but the system rejected the commands. The GSO attempted to change the land in place waypoint, but the system again rejected the command. The aircraft performed its land in place maneuver and collided with the bush, which resulted in the aircraft tipping over and coming to rest inverted.

The operator reviewed the aircraft systems and found the low voltage threshold to be overly restrictive. In addition, software prevented the flight crew from overriding the land in place command and regaining control of the aircraft by changing the waypoint.

Probable Cause and Findings

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

The flight crew's loss of control of the unmanned aircraft due to software limitations.
Contributing to the accident was the overly restrictive low voltage threshold limits.

Findings

Aircraft	(general) - Related operating info
Aircraft	(general) - Related operating info
Aircraft	(general) - Design

Factual Information

History of Flight

Maneuvering	Fuel exhaustion
Maneuvering	Electrical system malf/failure
Landing-flare/touchdown	Collision during takeoff/land (Defining event)

On March 14, 2023, about 1030 central daylight time, a Bell Textron APT70 unmanned aircraft, N314AL, was substantially damaged when it was involved in an accident near Mineral Wells, Texas. The aircraft was operated under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a flight test.

During the flight test, the aircraft returned to base and was in a transition to hover when the flight control computer registered a low battery voltage reading and went into an emergency automatic land in place flight command. The GSO attempted to override the system, but the system rejected the commands. The crew then noted the “F BATT CRIT LOW VOLT” warning illuminated, which initiated a descent for the aircraft to land at its present position. At the time, the aircraft was in a hover at an altitude of about 100 ft above the ground over a large bush when the Land Failsafe command was activated. A command was sent to the vehicle to override the landing command, but the ground control station indicated that the override command was rejected. The GSO then attempted to change the land in place waypoint, but the system again rejected the command. The aircraft performed its land in place maneuver and collided with a shrub, which resulted in the aircraft tipping over and coming to rest inverted. Substantial damage was sustained to the lower left wing section.

The operator reviewed the aircraft systems and found the low voltage threshold to be overly restrictive. In addition, a software limitation prevented the crew from overriding the land in place command by changing a waypoint.

Pilot Information

Certificate:	Commercial; Flight instructor	Age:	33,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	None
Other Aircraft Rating(s):	Helicopter; Unmanned (sUAS)	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane single-engine; Helicopter	Toxicology Performed:	
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	October 15, 2022
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	August 16, 2022
Flight Time:	1500 hours (Total, all aircraft), 1400 hours (Pilot In Command, all aircraft), 36 hours (Last 90 days, all aircraft), 12 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	BELL HELICOPTER TEXTRON INC	Registration:	N314AL
Model/Series:	APT70	Aircraft Category:	Powered-lift
Year of Manufacture:	2019	Amateur Built:	
Airworthiness Certificate:	Experimental (Special)	Serial Number:	002
Landing Gear Type:	Other launch/recovery system	Seats:	0
Date/Type of Last Inspection:	Unknown	Certified Max Gross Wt.:	500 lbs
Time Since Last Inspection:		Engines:	4 Electric
Airframe Total Time:	17.6 Hrs at time of accident	Engine Manufacturer:	Proprietary
ELT:	Not installed	Engine Model/Series:	
Registered Owner:	BELL TEXTRON INC	Rated Power:	5 Horsepower
Operator:	BELL TEXTRON INC	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KMWL, 942 ft msl	Distance from Accident Site:	3 Nautical Miles
Observation Time:	10:53 Local	Direction from Accident Site:	122°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	9 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	130°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.31 inches Hg	Temperature/Dew Point:	11°C / -3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Mineral Wells, TX	Type of Flight Plan Filed:	None
Destination:	Mineral Wells, TX	Type of Clearance:	None
Departure Time:		Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None	Latitude, Longitude:	32.8932,-98.2332(est)

Administrative Information

Investigator In Charge (IIC):	Aguilera, Jason
Additional Participating Persons:	Gerald Dotson; Federal Aviation Administration; Irving, TX Michael Roznick; Bell Helicopter; Fort Worth, TX
Original Publish Date:	March 28, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=106895

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).