Aviation Investigation Final Report

Location:	Seadrift, Texas	**Accident Number:**	CEN15LA132
Date & Time:	January 31, 2015, 14:45 Local	**Registration:**	N162RB
Aircraft:	BUTLER RAYMOND ROTORWAY EXEC 162F	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that the experimental, amateur-built helicopter was at 300 ft above ground level (agl) when the low rotor rpm horn sounded and the engine lost power. The pilot entered an autorotation and arrested the descent rate. When the helicopter was about 8 ft agl over tall grass, the main rotor speed further decelerated. The helicopter landed hard while it was still moving forward at high speed, which resulted in the landing gear separating.

The engine had been modified with a full authority digital electronic control (FADEC) system. Following the accident, the pilot tested the FADEC system and determined that the loss of engine power was caused by a fault in the No. 1 engine control module (ECM); every time the No. 1 ECM was turned on, the engine would quit; however, if the No. 1 ECM was turned off and the No. 2 ECM was turned on, the engine would operate. Although the helicopter was equipped with two ECMs, which should have provided redundant operation, it was determined that a single-point failure of the No. 1 ECM resulted in the engine failure.

Probable Cause and Findings

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

A fault in the No. 1 engine control module, which disabled the ignition system and resulted in the engine losing power; during the subsequent autorotation, the main rotor rpm was further reduced just before touchdown, which resulted in a hard landing.

Findings

Aircraft	DC generation system - Failure
Aircraft	(general) - Failure

Factual Information

History of Flight

Enroute-cruise	Loss of engine power (total) (Defining event)
Autorotation	Off-field or emergency landing

On January 31, 2015, about 1445 central standard time, an experimental amateur-built Rotorway Exec 162F, N162RB, landed hard during an emergency autorotation near Seadrift, Texas. The pilot and his passenger were not injured. The helicopter was substantially damaged. The helicopter was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan had been filed. The local flight originated from Port Lavaca, Texas, about 1420.

The pilot said they were flying at about 300 feet above ground level and were returning to Port Lavaca after a 25 minute sightseeing flight. The LOW ROTOR RPM horn sounded and the engine had lost power. The pilot entered an autorotation and picked a landing spot. He arrested the rate of descent but the helicopter had too much forward speed to set down vertically. As he maneuvered the helicopter into some tall heavy grass about 8 feet above the ground, the main rotor speed decelerated below the minimum safe rpm. The pilot said the helicopter was still moving forward at high speed and, as such, it landed hard, tearing off the landing gear.

According to the pilot, the stock Rotorway engine had been highly modified. An after-market Full Authority Digital Electronic Control (FADEC) system, designed specifically for the engine, had been installed. The FADEC system consisted of two separate and redundant Engine Control Modules (ECMs). On one occasion, the engine failed to start after the pilot had made a brief flight. He determined that there was a fault in the No. 1 ECM. Both ECMs were sent to the manufacturer for examination and testing. No problems were identified and they were returned to the pilot. He made four additional uneventful flights, totaling more than 3 hours, before the accident flight.

After the accident, the pilot examined and tested the ignition system since the manufacturer was no longer in business. With both ECMs on, the engine was started and ran normally. When the No. 1 ECM was switched off, the engine continued to run on the No. 2 ECM. When the No. 1 ECM was switched back on, the engine quit. The only way the engine would start was to turn on the No. 2 ECM and leave the No. 1 ECM off. Every time the No. 1 ECM was switched on, the engine would quit. The pilot switched the wiring harnesses and established that the problem followed the No. 1 ECM. He determined the fault lay solely in the No. 1 ECM.

Pilot Information

Certificate:	Private	**Age:**	62
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	April 9, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	3000 hours (Total, all aircraft), 350 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	BUTLER RAYMOND	**Registration:**	N162RB
Model/Series:	ROTORWAY EXEC 162F NO SERIES	**Aircraft Category:**	Helicopter
Year of Manufacture:	2008	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	6873
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	September 1, 2014 100 hour	**Certified Max Gross Wt.:**	1430 lbs
Time Since Last Inspection:	140 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	ROTORWAY
ELT:	Installed, activated	**Engine Model/Series:**	RI 162F
Registered Owner:	BUTLER WILLIAM RAYMOND	**Rated Power:**	152 Horsepower
Operator:	BUTLER WILLIAM RAYMOND	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KPKV,32 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	14:45 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 1900 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	14 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.01 inches Hg	**Temperature/Dew Point:**	19°C / 17°C
Precipitation and Obscuration:			
Departure Point:	Port Lavaca, TX (NONE)	**Type of Flight Plan Filed:**	None
Destination:	Port Lavaca, TX (NONE)	**Type of Clearance:**	None
Departure Time:	14:20 Local	**Type of Airspace:**	Class G

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:**	28.521667,-96.798332

Administrative Information

Investigator In Charge (IIC):	Scott, Arnold
Additional Participating Persons:	
Original Publish Date:	July 13, 2015
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=90676