



# Aviation Investigation Final Report

<b>Location:</b>	DeLeon Springs, Florida	<b>Accident Number:</b>	ERA18TA263
<b>Date &amp; Time:</b>	September 23, 2018, 15:45 Local	<b>Registration:</b>	N752VK
<b>Aircraft:</b>	Zenith CH 750	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	2 Minor
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

The private pilot/owner of the experimental, amateur-built airplane reported that, about 15 minutes into the local flight, the engine started "skipping" before completely losing power. He then set up for a forced landing to an open area. During the descent, he maneuvered to clear power lines. The airplane touched down at a steep descent angle, nosed over, and came to rest inverted, which resulted in substantial damage to the airframe.

The airplane's engine used an electronic control unit instead of magnetos and required at least one of the airplane's two onboard batteries to provide electrical energy to the ignition system for the engine to operate. Postaccident examination of the airplane revealed that both of its batteries were discharged. After the batteries were charged, the engine was started and ran normally. The alternator also charged the batteries normally. The cockpit instrument panel switch that enabled the alternator to supply energy to the airplane's electrical system, and thus charge the airplane's batteries, was unlabeled. When the switch was placed in the unlabeled on position, the alternator field wire received power and the alternator charged normally. The pilot reported that he may have inadvertently left it in the off position during the flight. With the switch in this position, the engine would have continued to run until the selected battery lost its charge. The pilot also reported that he did not use a checklist when operating the airplane. It is likely that the pilot failed to activate the airplane's alternator, which resulted in a discharge of the selected battery during the 15-minute flight. The subsequent loss of electrical power eventually resulted in the total loss of engine power.

Additionally, the airplane was not equipped with an alternator warning light as recommended by the engine manufacturer. Had the airplane been equipped with such a light, the pilot might have realized that he had failed to turn the alternator on and that it was not providing energy to the electrical system to sustain the charge of the selected battery.

## Probable Cause and Findings

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

The pilot's operation of the airplane with the alternator switch in the off position, which allowed the selected battery to discharge and resulted in an ignition system failure and a total loss of engine power.

### Findings

<b>Aircraft</b>	AC generator-alternator - Not used/operated
<b>Personnel issues</b>	Forgotten action/omission - Pilot
<b>Personnel issues</b>	Use of checklist - Pilot
<b>Aircraft</b>	DC indicating system - Design

# Factual Information

## History of Flight

Enroute-cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing-landing roll	Nose over/nose down

On September 23, 2018, about 1545 eastern daylight time, a Zenith Aircraft Company CH 750, N752VK, was substantially damaged following a forced landing near DeLeon Springs, Florida. The private pilot and one passenger sustained minor injuries. The airplane was operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight that originated from DeLand Municipal Airport (DED), DeLand, Florida, about 1530.

The pilot/owner reported that while over the DeLeon Springs area, the engine started "skipping." The engine then lost all power and the propeller stopped. He set up for a forced landing to an open area. During the descent, he observed power lines and maneuvered to clear them. The airplane touched down at a steep descent angle. After touchdown, the airplane nosed over and came to rest inverted.

An inspector with the Federal Aviation Administration responded to the accident site and examined the wreckage. He reported that the engine firewall, wings, and vertical stabilizer had structural damage. Further examination of the wreckage revealed that the airplane was equipped with two 12v motorcycle batteries, and both were discharged. One battery indicated 0.75 volts and the other indicated 7 volts. Both batteries were then charged by the inspector and a mechanic, who were then able to start the airplane's Viking 110 engine normally. The alternator was found to be charging normally with the engine running and the bus voltage was greater than 13.5 volts.

The key-actuated rotary (ignition) switch on the cockpit instrument panel controlled the airplane's alternator and started the airplane's engine was unlabeled. When the switch was placed in the unlabeled on position, the alternator field wire received power and the alternator charged normally. When placed to the unlabeled off position, power was removed from the alternator field wire, and the engine continued to run as long as one of the unlabeled battery toggle switches was turned on. The Viking 110 engine manual recommended an alternator warning light installation; however, the inspector noted that there was no light installed.

The pilot reported to the FAA inspector that he may have left the alternator switch in the unlabeled off position by mistake. The pilot also reported that he did not utilize a checklist when operating the airplane.

The Viking 110 engine manual reminds operators that the engine is controlled by an electronic control unit (ECU) versus mechanically operated magnetos and at least one battery must maintain its charge for the engine to operate.

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	79,Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Unknown
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Sport pilot None	<b>Last FAA Medical Exam:</b>	April 14, 2011
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	237 hours (Total, all aircraft), 195 hours (Pilot In Command, all aircraft), 7 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Zenith	<b>Registration:</b>	N752VK
<b>Model/Series:</b>	CH 750	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2012	<b>Amateur Built:</b>	Yes
<b>Airworthiness Certificate:</b>	Experimental (Special)	<b>Serial Number:</b>	75-8435
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	October 21, 2017 Condition	<b>Certified Max Gross Wt.:</b>	1325 lbs
<b>Time Since Last Inspection:</b>	55 Hrs	<b>Engines:</b>	Reciprocating
<b>Airframe Total Time:</b>	701 Hrs at time of accident	<b>Engine Manufacturer:</b>	Viking
<b>ELT:</b>	Not installed	<b>Engine Model/Series:</b>	110
<b>Registered Owner:</b>		<b>Rated Power:</b>	110 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KDED, 79 ft msl	<b>Distance from Accident Site:</b>	6 Nautical Miles
<b>Observation Time:</b>	19:15 Local	<b>Direction from Accident Site:</b>	145°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots /	<b>Turbulence Type Forecast/Actual:</b>	None / None
<b>Wind Direction:</b>	90°	<b>Turbulence Severity Forecast/Actual:</b>	N/A / N/A
<b>Altimeter Setting:</b>	29.97 inches Hg	<b>Temperature/Dew Point:</b>	31°C / 21°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	DeLand, FL (DED )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	DeLand, FL (DED )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	15:30 Local	<b>Type of Airspace:</b>	Class G

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Minor	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	1 Minor	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Minor	<b>Latitude, Longitude:</b>	29.139722, -81.343055(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Hicks, Ralph
<b>Additional Participating Persons:</b>	Scott Strickland; FAA/FSDO; Orlando, FL
<b>Original Publish Date:</b>	November 19, 2019
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=98357">https://data.nts.gov/Docket?ProjectID=98357</a>

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).