



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Sanford, NC	<b>Accident Number:</b>	ERA17TA196
<b>Date &amp; Time:</b>	05/29/2017, 1330 EDT	<b>Registration:</b>	N167EZ
<b>Aircraft:</b>	ERNEST T CHRISTLEY ZENITH ZODIAC 601XL	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Fuel starvation	<b>Injuries:</b>	1 None
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Personal		

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## Analysis

The private pilot, who was the builder of the experimental, amateur-built airplane, reported that the airplane was in cruise flight when the engine experienced a total loss of power. He noted that the right fuel tank was empty and that the fuel selector handle was on the left tank. He attempted a restart; however, this was unsuccessful, and he performed a forced landing in a field. The nose landing gear collapsed during the landing roll, resulting in structural damage to the lower fuselage and engine firewall.

Examination of the wreckage revealed that the fuel tank selector handle was on the left tank but the fuel valve remained on the empty right tank. Further examination of the hardware revealed that a threaded metal rod that the pilot installed to connect the tank selector handle to the fuel valve "twisted like bubble gum" when rotated and would not turn the fuel valve. The pilot, who was the airplane builder, used a thinner rod than specified due to an interference problem. This rod was not part of the airplane kit and was improvised by the pilot. The pilot reported that the handle/valve assembly had operated normally during initial testing.

## Probable Cause and Findings

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

The pilot's selection of a threaded metal rod of insufficient strength to connect the fuel tank selector handle to the fuel valve, which resulted in his inability to switch fuel tanks and a subsequent total loss of engine power due to fuel starvation.

## Findings

<b>Aircraft</b>	Fuel selector/shutoff valve - Capability exceeded (Cause) Fuel - Related operating info (Cause)
<b>Personnel issues</b>	Decision making/judgment - Owner/builder (Cause)

## Factual Information

On May 29, 2017, at 1330 eastern daylight time, an experimental, amateur-built Zenith Zodiac 601XL, N167EZ, was substantially damaged during a forced landing at Sanford, North Carolina. The private pilot was not injured. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations part 91 as a personal flight. Day, visual meteorological conditions prevailed at the time, and no flight plan was filed. The local flight originated at Deck Airpark (NC11), Apex, North Carolina at 1145.

The pilot reported that he was returning to his home airport, at 6,000 feet mean sea level, when the engine lost all power. He noticed that the right fuel tank was empty; however, he thought that the engine was feeding from the left tank. He attempted a restart, and the engine momentarily started, then lost power again. Unable to restart the engine, he performed a forced landing in a plowed field.

An inspector with the Federal Aviation Administration responded to the accident site and examined the wreckage. The nose gear collapsed during the forced landing, resulting in structural damage to the lower fuselage and engine firewall. The engine and propeller were undamaged. The right fuel tank was empty and the left tank contained fuel. The fuel tank selector handle in the cockpit was found at the left tank position; however, the fuel tank valve remained in the right tank position and could not be moved to the left tank position.

The fuel tank selector valve hardware was examined. The connection between the tank selector handle and the fuel valve consisted of a threaded metal rod, about one foot in length. The pilot, who was the airplane builder, reported that the rod "twisted like bubble gum" when the handle was rotated without changing the position of the valve. He used a thinner rod due to an interference problem during construction. The rod was not part of the airplane kit and was improvised by the pilot. The pilot reported that the handle/valve assembly operated normally during initial testing.

## History of Flight

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

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	50, 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>	4-point
<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>	
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	07/11/2016
<b>Flight Time:</b>	147 hours (Total, all aircraft), 60 hours (Total, this make and model), 101 hours (Pilot In Command, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	ERNEST T CHRISTLEY	<b>Registration:</b>	N167EZ
<b>Model/Series:</b>	ZENITH ZODIAC 601XL	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2016	<b>Amateur Built:</b>	Yes
<b>Airworthiness Certificate:</b>	Experimental	<b>Serial Number:</b>	4942
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	10/12/2016, Condition	<b>Certified Max Gross Wt.:</b>	1320 lbs
<b>Time Since Last Inspection:</b>	60 Hours	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	60 Hours at time of accident	<b>Engine Manufacturer:</b>	Chevrolet
<b>ELT:</b>	C126 installed, activated, did not aid in locating accident	<b>Engine Model/Series:</b>	Corvair
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	100 hp
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	TTA, 246 ft msl	Distance from Accident Site:	4 Nautical Miles
Observation Time:	1320 EDT	Direction from Accident Site:	260°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	300°	Turbulence Severity Forecast/Actual:	/ N/A
Altimeter Setting:	29.96 inches Hg	Temperature/Dew Point:	29° C / 16° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Apex, NC (NC11)	Type of Flight Plan Filed:	None
Destination:	Apex, NC (NC11)	Type of Clearance:	None
Departure Time:	1145 EDT	Type of Airspace:	Class E

## 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:	35.443611, -79.111111 (est)

## Administrative Information

Investigator In Charge (IIC):	Ralph E Hicks	Report Date:	11/06/2018
Additional Participating Persons:	Mark Allen; FAA/FSDO; Greensboro, NC		
Publish Date:	11/06/2018		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=95307">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=95307</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](#).