# Aviation Investigation Final Report

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| **Location:** | Spanaway, Washington | **Accident Number:** | WPR17LA087 |
| **Date & Time:** | April 13, 2017, 09:40 Local | **Registration:** | N5131H |
| **Aircraft:** | Titan TORNADO I | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Flight control sys malf/fail | **Injuries:** | 1 Serious |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The pilot reported that after departure for the personal flight, the airplane climbed to about 200 ft above ground level but he could not maintain level flight; he had to apply full right aileron and right rudder. The airplane rolled left, and he simultaneously reduced the engine power and applied forward elevator in an attempt to arrest the roll. Despite his attempts, the pilot could not regain control of the airplane and deployed the ballistic recovery system parachute (BRS). The airplane touched down hard off the airport, and the nose landing gear collapsed. As a result of the impact, the pilot was unable to egress under his own power; the engine continued to run, and the BRS drifted into the propeller. The engine continued to operate until the BRS suspension lines stopped the propeller.

The examination of the aileron system revealed that the control tube was disconnected from the control mixer weldment. The stop nut that normally is affixed to the bolt connecting the aileron control tube to the control yoke tube was found on the cabin floor. The bolt end had a hole for a cotter pin, but no cotter pin was located. There were no markings on the nylon insert of the stop nut, which is consistent with the nut not being adequately attached during assembly.

During the last condition inspection, about 4 months and 24 flight hours before the accident, an airframe and powerplant mechanic had adjusted the aileron control mixer. It is likely that during that maintenance activity, the nylon hardware was not properly attached to the aileron control tube.

## Probable Cause and Findings

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

Maintenance personnel's improper attachment of the aileron system components, which resulted in the pilot's inability to maintain flight control.

## Findings

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| **Aircraft** | Aileron control system - Inadequate inspection |
| **Personnel issues** | Scheduled/routine maintenance - Maintenance personnel |

# Factual Information

## History of Flight

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| **Prior to flight** | Aircraft maintenance event |
| **Takeoff** | Flight control sys malf/fail (Defining event) |
| **Emergency descent** | Off-field or emergency landing |

On April 13, 2017, about 0940 Pacific daylight time, an experimental Titan Tornado I airplane, N5131H, collided with terrain shortly after takeoff from Spanaway Airport, Spanaway, Washington. The commercial pilot was seriously injured. The airplane sustained substantial damage. The airplane was registered to and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed and no flight plan was filed for the flight which was originating at the time and was destined for Auburn, Washington.

Witnesses stated that they observed the airplane climb out and turn. The ballistic recovery parachute (BRS) was activated while the airplane was at a low altitude. The accident site was located about 450 ft from the runway.

The pilot stated that the purpose of his flight was to commute to his place of employment in Auburn. A normal preflight check was completed and the flight departed from runway 16. As the airplane climbed about 200 ft above ground level (agl), the pilot could not maintain level flight and he had to apply full right aileron and right rudder. The airplane rolled left and he simultaneously reduced the engine power and applied forward elevator in an attempt to arrest the roll. Despite his attempts, the airplane continued to roll left with the nose about 180° from the runway heading. Unable to regain directional control, the pilot decided to deploy the BRS. With an airspeed of about 80 mile per hour (MPH) and a level nose-pitch, the pilot pulled the activation handle.

The pilot reported that after deploying the BRS, the left roll reduced to less than 5° of bank and he realized that he would not be able to return back to the runway. He concentrated his efforts on avoiding the trees and executed a forced landing in a field adjacent to the runway. He attempted to configure the airplane in a landing flare prior to touchdown by applying aft elevator. The airplane did not respond and touched down hard on the main landing gear, followed by the nose gear collapsing. As a result of the impact, the pilot's legs were injured and he was unable to egress under his own power. The engine continued to run and the BRS drifted into the propeller. The damage to the instrument panel made him unable to shut down the engine and it continued to operate until the BRS suspension lines stopped the propeller.

## Pilot Information

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| **Certificate:** | Commercial; Flight instructor | **Age:** | 32,Male |
| **Airplane Rating(s):** | Single-engine land; Multi-engine land | **Seat Occupied:** | Front |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | Unknown |
| **Instrument Rating(s):** | Airplane; Helicopter | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | Airplane single-engine; Helicopter; Instrument airplane; Instrument helicopter | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 2 Without waivers/limitations | **Last FAA Medical Exam:** | March 27, 2017 |
| **Occupational Pilot:** | Yes | **Last Flight Review or Equivalent:** | April 4, 2017 |
| **Flight Time:** | 1409 hours (Total, all aircraft), 24 hours (Total, this make and model), 1224 hours (Pilot In Command, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Titan | **Registration:** | N5131H |
| **Model/Series:** | TORNADO I NO SERIES | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | 2006 | **Amateur Built:** | |
| **Airworthiness Certificate:** | Experimental (Special) | **Serial Number:** | T95XXXCOHK0177 |
| **Landing Gear Type:** | Tricycle | **Seats:** | 2 |
| **Date/Type of Last Inspection:** | December 15, 2016 Condition | **Certified Max Gross Wt.:** | 850 lbs |
| **Time Since Last Inspection:** | 24 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 224 Hrs at time of accident | **Engine Manufacturer:** | Rotax 501 |
| **ELT:** | Not installed | **Engine Model/Series:** | |
| **Registered Owner:** | On file | **Rated Power:** | 52 Horsepower |
| **Operator:** | On file | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | KTCM,323 ft msl | **Distance from Accident Site:** | 4 Nautical Miles |
| **Observation Time:** | 16:58 Local | **Direction from Accident Site:** | 331° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | Overcast / 7000 ft AGL | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 10 knots / None | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 190° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.77 inches Hg | **Temperature/Dew Point:** | 10°C / 8°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Spanaway, WA (S44 ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Auburn, WA (S50 ) | **Type of Clearance:** | None |
| **Departure Time:** | 09:35 Local | **Type of Airspace:** | |

## Airport Information

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| **Airport:** | SPANAWAY S44 | **Runway Surface Type:** | |
| **Airport Elevation:** | 385 ft msl | **Runway Surface Condition:** | Vegetation |
| **Runway Used:** | | **IFR Approach:** | None |
| **Runway Length/Width:** | | **VFR Approach/Landing:** | Forced landing |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Serious | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Serious | **Latitude, Longitude:** | 47.081665,-122.428337(est) |

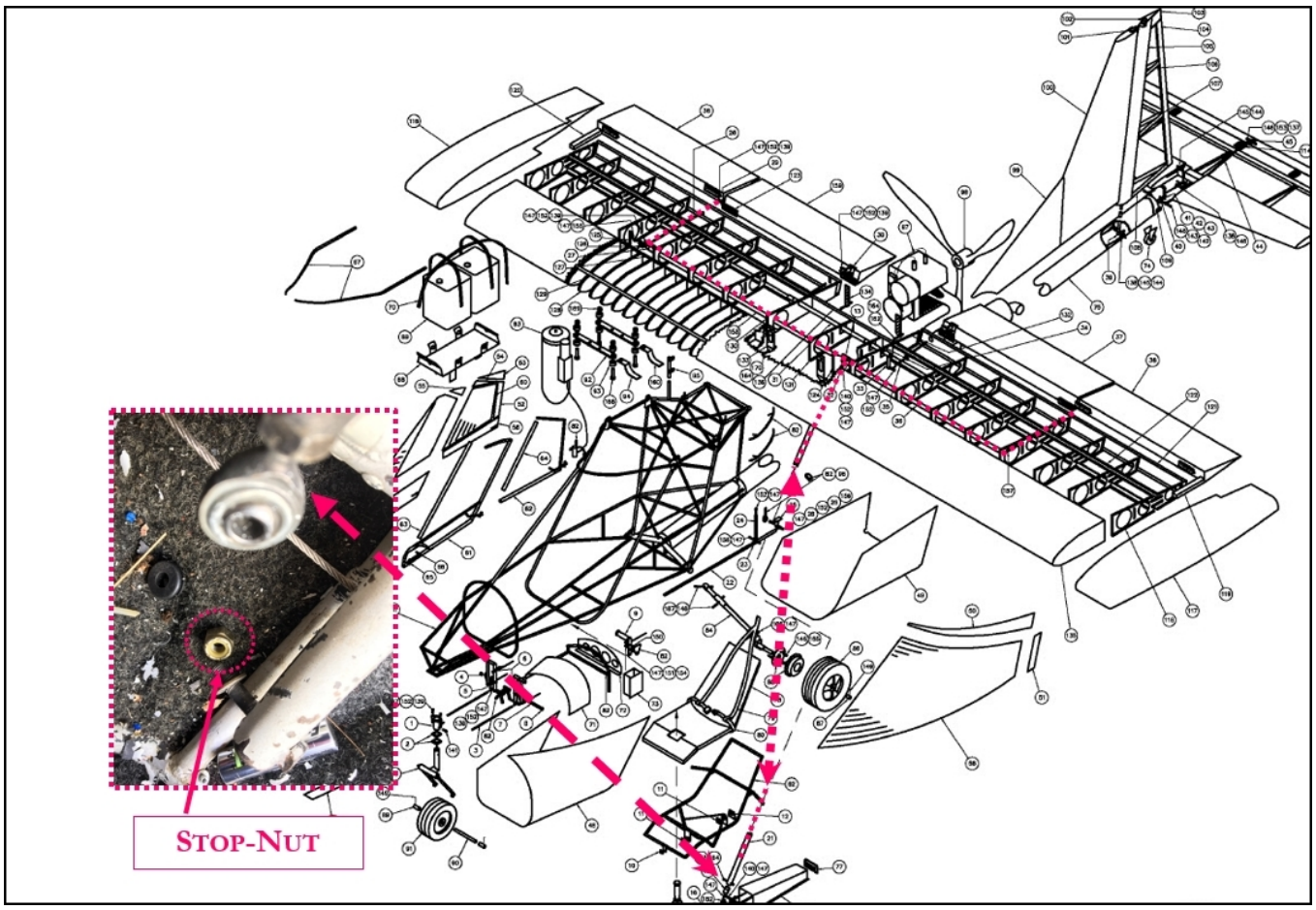
The accident site was located on flat terrain about 435 ft east of the south end of the Spanaway Airport. The major sections of the airplane were all located within the immediate vicinity of the wreckage. The BRS, model number T2 300 (serial number T2B03690),was deployed with the parachute fabric draped on the terrain adjacent to the left wing. The fuel cap remained affixed to the intact fuel cell; the outside reference gauge indicated there was about 7.5-9 gallons of fuel on board.

The airplane was configured in a pusher-type style, with the engine mounted above and aft of the cockpit. The propeller remained attached to the engine with all three blades intact. Approximately 3-4 ft of the BRS suspension lines were tightly wrapped around the propeller prohibiting crankshaft rotation. The activation handle inside the cockpit appeared to be in the "deployed position." There was a placard in the cockpit that read "Aircraft engine must be shut off prior to deploying parachute. Failure to do so may result in death or serious injury." The canopy, suspension lines, and slider remained intact and no damage was noted.

Flight Controls

During the post-accident examination, control continuity for the rudder and elevator systems was established. An examination of the aileron system revealed that there was control continuity from the aileron control surfaces to the control tube in the cockpit. The upper attach point of the control tube (near wings) remained intact and the lower end (in cockpit) was found disconnected from the control mixer weldment. The stop-nut that normally is affixed to the bolt connecting the aileron control tube to the control yoke tube was found on the cabin floor about 5 inches from the ball joint (see picture 1). The bolt end had a hole for a cotter pin, but no cotter pin was located. There was no markings on the nylon insert of the stop nut consistent with it not being adequately tightened during the last maintenance.

The pilot reported that at the last condition inspection on 12/15/2016, the airframe and powerplant mechanic had adjusted the aileron control mixer. The airplane accumulated about 24 flight hours since the inspection.




Picture 1: Aileron System

## Administrative Information

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| **Investigator In Charge (IIC):** | Keliher, Zoe |
| **Additional Participating Persons:** | Chris Melchior; Federal Aviation Administration; Renton, WA |
| **Original Publish Date:** | May 28, 2020 |
| **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=95012 |