# Aviation Investigation Final Report

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| **Location:** | Eatonville, Washington | **Accident Number:** | SEA02LA012 |
| **Date & Time:** | November 8, 2001, 16:15 Local | **Registration:** | N3VT |
| **Aircraft:** | Thurston Pitts S-1S | **Aircraft Damage:** | Substantial |
| **Defining Event:** | | **Injuries:** | 1 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The experienced acrobatic pilot was practicing acrobatic maneuvers when the Pitts S-1S biplane transitioned from a near vertical, inverted stall into an inverted flat spin. The aircraft continued in the spin through 15-20 revolutions descending vertically until ground impact. There was evidence that the aircraft's canopy had been jettisoned during the descent as it was located relatively undamaged 150 feet from the ground impact site. The pilot's restraint system (lap belt and shoulder harness) however, had not been released. No control malfunction was noted during the post-crash investigation. Pilot records documented only one known reference to the pilot's having encountered an inverted spin, and this maneuver was referenced as an inadvertent inverted spin. An experienced S-1S pilot who had conducted inverted spins reported that the recovery process was characteristically simple and only required a release of the controls provided there was not a significantly aft center of gravity.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's unsuccessful corrective action (recovery) from an inverted spin. A contributing factor was the pilot's encounter with the inverted spin maneuver.

### Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: DESCENT

Findings
1. (F) STALL/SPIN - ENCOUNTERED - PILOT IN COMMAND
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Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
2. (C) REMEDIAL ACTION - NOT SUCCESSFUL - PILOT IN COMMAND

## Factual Information

HISTORY OF FLIGHT

On November 8, 2001, approximately 1615 Pacific standard time, a Thurston Pitts S-1S experimentally certificated homebuilt aircraft, N3VT, registered to and being flown by a private pilot was substantially damaged during collision with terrain while in an inverted spin approximately one mile southeast of Eatonville, Washington. The pilot, who was the sole occupant, was fatally injured. Visual meteorological conditions existed and no flight plan had been filed. The flight, which was personal, was operated under 14 CFR 91, and originated from Thun Field (1S0), Puyallup, Washington, approximately 1555.

A witness, located approximately one nautical mile southwest of the accident site, reported seeing the aircraft enter into an inside loop. Just before the aircraft reached the top of the loop, a snap roll was observed and the aircraft transitioned into an outside loop. Approximately 260 degrees into the outside loop (just before the aircraft reached a pure vertical climb) the outside loop appeared to terminate and the witness watched as the aircraft continued in a steep, near vertical inverted climb up to the point where the aircraft's forward motion stopped. He reported hearing the engine "...as strong as ever..." up to this point. The sound of the engine then stopped and he observed the aircraft drift backwards about four to five plane lengths into a flat, inverted attitude. The aircraft was then observed to descend vertically, in an inverted attitude, slowly rotating about 1.5 to 2 seconds per full rotation (refer to Witness statement 1).

A second witness, located approximately one-half nautical mile north of the accident site, reported watching the aircraft engaged in an acrobatic routine along a north-south line between 3,000 and 4,000 feet. He observed the aircraft enter a vertical climb followed by a vertical snap roll with two full revolutions at the top, at which time, the aircraft flopped over on its back and entered an inverted, flat spin. The spin continued for 15 to 20 revolutions before ground impact (refer to Witness statement 2).

A third witness, located approximately one-third nautical mile east of the accident site, reported seeing the aircraft engaged in acrobatic maneuvers. A short time later, the witness, who was inside a residence, observed the aircraft descending straight down and observed something come off the aircraft in the descent. The witness reported that the plane landed flat on its back and that he did not hear any engine sound during the descent (refer to Witness statement 3).

PERSONNEL INFORMATION

The certificated private pilot held airplane single-engine land and airplane instrument ratings as well as a second class medical without waivers/limitations issued on September 3, 2000. The pilot's total flight experience was determined based upon a flight logbook (logbook number 2), which opened on May 18, 1996, with a total of 289.3 hours brought forward, and closed on March 25, 2000. Additionally, 86 pages of individual notepad (3X7) sheets containing beginning and ending tachometer times for N3VT for the period starting January 23, 2000, and ending November 8, 2001, were added to the logbook times.

Based on the above records, the pilot's estimated total flight time (all single-engine) was approximately 909 hours of which approximately 858 hours were pilot in command. His total time in N3VT was approximately 500 hours accrued prior to November 8, 2001, and dating back to August 30, 1997.

The logbook contained 572 individual flight entries and virtually every flight had two lines of additional information written into the remarks column at the end of each flight entry. The remarks were reviewed for each of these flights and it was noted that a large percentage of the remarks referred to acrobatic maneuvers being practiced/performed by the pilot. Some of the maneuvers commonly referenced in the remarks were square loops, inverted turns, (half/full) Cuban eights, sharks, humpties, hammerhead stalls, snap rolls, inside/outside loops, Immelmanns, vertical rolls, spins and formation flight. He was considered to be an experienced acrobatic pilot and had won several competition trophies. A review of the comments and remarks in this logbook identified only one reference to an inverted spin, which was made on a flight logged on January 7, 2000. The remarks read "first flight of 2000, lotsa cloud layers, unintended inv spin from hammer 1 ¼, free Px2."

## AIRCRAFT INFORMATION

The aircraft was a homebuilt Thurston Pitts single seat S-1S biplane equipped with a 180 horsepower Lycoming IO-360-B4D engine. According to Federal Aviation Administration (FAA) records the aircraft was registered to the pilot on November 5, 1997. The pilot's flight logbook showed his first flight in N3VT on August 30, 1997, in Rostraver, Pennsylvania, where the previous owner kept the aircraft.

The aircraft was built by the original owner (Thurston) and first flown and certificated on November 21, 1976. The airframe and engine logs showed the aircraft being transferred to Pennsylvania on or before June 15, 1995, and then being transferred to the Seattle area between May 24, 1997, and September 9, 1997. The most recent airframe and power plant inspections were conducted in early September of 2001. The aircraft log showed that the aircraft had been flight tested through a number of acrobatic maneuvers on March 9, 1977 (refer to ATTACHMENT L-I).

According to a fuel slip recovered from the accident site, the aircraft had taken on approximately 13 gallons of fuel purchased at Thun Field, and the receipt had a time stamp of

1551 local time on the date of the accident.

A Pitts S-1S pilot, who was experienced in and had performed inverted spins in the aircraft, reported to the investigator-in-charge in a telephone interview that the spin recovery characteristics of the S-1S were fairly straightforward and that a pilot need only release the controls to effect a recovery. He also noted that he believed spin recovery from an inverted spin in the S-1S was easier than upright spin recoveries in the same aircraft and that, exclusive of an extreme aft center of gravity condition, control inputs would be required by the pilot to maintain the aircraft in an inverted spin condition.

## WRECKAGE AND IMPACT INFORMATION

The aircraft crashed in an open, relatively level, grassy field approximately two nautical miles southeast of Eatonville, Washington, (refer to CHART I). The aircraft was initially found inverted resting on the top surface of its upper wings and with its vertical stabilizer/rudder embedded in the soil in a near vertical attitude and with its nose pointed in a westerly direction. There was little evidence of rotation (i.e., bending or side load distortion of the vertical stabilizer rudder) about the aircraft's vertical axis (refer to photograph 1). The aircraft was subsequently returned to an upright position during recovery of the pilot and before the investigator arrived on site. Law enforcement personnel reported that the pilot's lap belt and shoulder harness (single point system) was still latched at the accident site.

The aircraft displayed extensive crushing from top to bottom along the vertical axis and in the vicinity of the cockpit area, upper wing, engine area and the previously mentioned vertical stabilizer/rudder area. All components associated with the aircraft were found at the ground impact site with the exception of the aircraft's Plexiglas canopy (refer to photographs 2 and 3).

The propeller remained attached to the engine and both blades displayed chordwise scraping. One blade was noted to have a slight amount of forward bending, which was not evident on the opposing blade (refer to photograph 4). The opposing blade had a prominent leading edge gouge (refer to photograph 5). The empennage, including the horizontal and vertical surfaces and their attached elevators and rudder, sustained lesser damage with the exception of the previously described vertical crushing (refer to photograph 6).

The aircraft's canopy was located approximately 150 feet southwest of the fuselage ground impact site (refer to photograph 7). The canopy displayed very little damage. The FAA inspector on site examined the aircraft and established continuity of the flight and engine controls noting that all control surfaces remained attached to the aircraft. He also examined the engine and confirmed compression on all four cylinders during manual rotation of the propeller (refer to ATTACHMENT FAA-I).

## MEDICAL AND PATHOLOGICAL INFORMATION

John D. Howard, M.D., conducted the post-mortem examination of the pilot at the facilities of the Pierce County Medical Examiner's Office, Tacoma, Washington, on November 11, 2001, (case number 01-1124).

The FAA's Toxicology Accident and Research Laboratory, Oklahoma City, Oklahoma, conducted toxicological evaluation of samples from the pilot. The findings were reported as negative for carbon monoxide, cyanide and volatiles. An undetermined amount of Ranitidine (over-the-counter Zantac) was detected in blood and urine (refer to attached TOXICOLOGY report).

ADDITIONAL INFORMATION

Inspector William J. Reichardt, the assigned FAA coordinator, conducted on-site examination of the wreckage on November 9, 2001.

## Pilot Information

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| **Certificate:** | Private | **Age:** | 48,Male |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Front |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 2 Valid Medical--no waivers/lim. | **Last FAA Medical Exam:** | September 5, 2000 |
| **Occupational Pilot:** | UNK | **Last Flight Review or Equivalent:** | September 3, 2000 |
| **Flight Time:** | 909 hours (Total, all aircraft), 500 hours (Total, this make and model), 858 hours (Pilot In Command, all aircraft), 23 hours (Last 90 days, all aircraft), 1 hours (Last 30 days, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Thurston | **Registration:** | N3VT |
| **Model/Series:** | Pitts S-1S | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | Yes |
| **Airworthiness Certificate:** | Experimental (Special) | **Serial Number:** | 7-0164 |
| **Landing Gear Type:** | Tailwheel | **Seats:** | 1 |
| **Date/Type of Last Inspection:** | September 6, 2001 Condition | **Certified Max Gross Wt.:** | 1150 lbs |
| **Time Since Last Inspection:** | 20 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 964 Hrs at time of accident | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Not installed | **Engine Model/Series:** | IO-360-B4A |
| **Registered Owner:** | Taylor, Michael L. | **Rated Power:** | 180 |
| **Operator:** | | **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:** | 20 Nautical Miles |
| **Observation Time:** | 15:55 Local | **Direction from Accident Site:** | 300° |
| **Lowest Cloud Condition:** | Few / 15000 ft AGL | **Visibility** | 7 miles |
| **Lowest Ceiling:** | Broken / 25000 ft AGL | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 3 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 140° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.22 inches Hg | **Temperature/Dew Point:** | 11°C / 4°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Puyallup, WA (1S0 ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | | **Type of Clearance:** | None |
| **Departure Time:** | 15:55 Local | **Type of Airspace:** | Class G |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Fatal | **Latitude, Longitude:** | 46.841945,-122.244445 |

## Administrative Information

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| **Investigator In Charge (IIC):** | Mccreary, Steven |
| **Additional Participating Persons:** | William J Reichardt; FAA Renton FSDO; Renton, WA |
| **Original Publish Date:** | February 25, 2003 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=53740 |