# Aviation Investigation Final Report

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| **Location:** | Longmont, Colorado | **Accident Number:** | DEN03FA074 |
| **Date & Time:** | April 26, 2003, 12:15 Local | **Registration:** | N399DB |
| **Aircraft:** | Christen Industries Pitts S-2B | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | | **Injuries:** | 2 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

Several witnesses observed the airplane prior to the accident. One witness said the airplane had been doing aerobatics in the area - "loops and figure eights" The witness said as the airplane proceeded eastward, it got lower in altitude. The witness said, "He was about 500 feet over the field, he did a low loop and came back up the backside of the loop in what appeared to be an attempt at a hammerhead stall. The engine sputtered and quit and there wasn't room for a recovery." Another witness said he was driving north and saw the airplane overhead. He said the airplane had just done a loop and was going up vertically. The witness said he lost sight of the airplane. When he saw the airplane again, it was coming down at nearly an 80-degree angle until it impacted into the field. A third witness said he heard the sound of the airplane's engine change suddenly. He said he looked up to see the airplane low to the ground and heading straight down. He said, "The engine sound was as if the engine had quit." A fourth witness said the airplane made several loud pops as it was heading towards the ground. An examination of the airplane's engine showed no fuel in the fuel distribution manifold, distribution lines, nozzles, fuel filter, or in the fuel lines from the main fuel tank to the engine fuel pumps. Approximately 0.10 ounces of fuel was retrieved from the engine driven fuel pump. The fuel boost pump was broken aft and showed no evidence of fuel. All other engine components examined and tested revealed no pre-impact anomalies. No other anomalies were found with the airplane.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's improper in-flight planning and decision that resulted in fuel exhaustion and his entering an aerobatic maneuver with insufficient altitude. Factors contributing to the accident were the low airspeed and low altitude, and the fuel exhaustion.

### Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: MANEUVERING

Findings
1. (F) FLUID,FUEL - EXHAUSTION
2. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
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Occurrence #2: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY
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Occurrence #3: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Findings
3. (C) AEROBATICS - IMPROPER - PILOT IN COMMAND
4. (F) AIRSPEED - LOW
5. (F) ALTITUDE - LOW
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Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: MANEUVERING

Findings
6. TERRAIN CONDITION - GROUND

## Factual Information

HISTORY OF FLIGHT

On April 26, 2003, at 1215 mountain daylight time, a Christen Industries, Pitts S-2B, N399DB, piloted by a private pilot, was destroyed when it impacted into a field 3 miles north of Longmont, Colorado. Visual meteorological conditions prevailed at the time of the accident. The personal flight was being conducted under the provisions of Title 14 CFR Part 91 without a flight plan. The pilot and a commercial pilot-rated passenger on board the airplane were fatally injured. The local flight originated at Boulder, Colorado, at 1000.

Several witnesses observed the airplane prior to the accident. One witness said the airplane had been doing aerobatics in the area - "loops and figure eights" The witness said as the airplane proceeded eastward, it got lower in altitude. The witness said, "He was about 500 feet over the field, he did a low loop and came back up the backside of the loop in what appeared to be an attempt at a hammerhead stall. The engine sputtered and quit and there wasn't room for a recovery."

Another witness said he was driving north and saw the airplane overhead. He said the airplane had just done a loop and was going up vertically. The witness said he lost sight of the airplane. When he saw the airplane again, it was coming down at nearly an 80-degree angle until it impacted into the field.

A third witness said he heard the sound of the airplane's engine change suddenly. He said he looked up to see the airplane low to the ground and heading straight down. He said, "The engine sound was as if the engine had quit."

A fourth witness said the airplane made several loud pops as it was heading towards the ground.

PERSONNEL INFORMATION

The pilot-in-command (rear cockpit seat) held a private pilot certificate dated 05/24/2000, with single engine land, instrument ratings, and glider ratings.

According to his personal logbook, the pilot had 2,408.0 total flying hours and 105.2 total hours in the make and model airplane.

The pilot held a third class medical certificate dated 09/21/2001. The certificate showed the following limitation: Holder shall possess correcting glasses for near vision while exercising the privileges of his/her airman certificate.

The pilot-rated passenger in the front seat held a commercial pilot certificate dated 10/22/1999, with single and multiengine land, instrument, and helicopter/rotorcraft ratings.

Federal Aviation Administration aeromedical records showed the pilot reporting having approximately 3,000 total flying hours.

The pilot-rated passenger held a second class medical certificate dated 02/05/2003. The certificate showed no limitations.

AIRCRAFT INFORMATION

The airplane, a Christen Industries Pitts S-2B, serial number 5137, was a bi-winged, fabric-covered, canopy enclosed cockpit airplane, certified for aerobatic flight. The airplane, manufactured in 1988, was owned and operated by Connair, Incorporated, and used for pleasure. The airplane's most recent registration was dated January 7, 2002.

According to the airplane logbooks, the airplane had an annual inspection completed on November 11, 2002. The airplane's total time at the annual inspection, taken from the tachometer, was recorded as 216.20 hours. The airplane's tachometer reading at the accident site showed 261.05 hours.

WRECKAGE AND IMPACT INFORMATION

The National Transportation Safety Board on-scene investigation began at 1450.

The accident site was located in a field approximately 100 feet east of 83rd Avenue, a north-south running paved road, 1,060 feet south of Yellowstone Road, an east-west running gravel road, and 3 miles north of Colorado State Highway 66 at Longmont, Colorado, an east-west running, paved 4-lane road. The accident site was located at geographical coordinates 40 degrees 14.77 minutes north latitude, and 105 degrees 09.68 minutes west longitude.

The airplane main wreckage consisted of the engine, propeller, fuselage, main landing gear, wings, empennage, and tail wheel. The wreckage was oriented on a 255-degree magnetic heading.

The airplane's engine, propeller, cowling, and forward fuselage, rested in a 3-foot long, 4-foot wide, and 17-inch deep impact crater. The three wood propeller blades were broken aft. Blade A was broken aft at the hub and showed some leading edge crush at mid-span. Blade B was broken at the hub and was crushed and broken aft. Blade B showed some nicks in the leading edge metal strip. Blade C was broken aft approximately 3 inches outboard of the hub. The fractured blade was highly fragmented and splintered. Blade C also showed chordwise scratches near the blade tip and some nicks in the leading edge metal strip. The propeller spinner was crushed aft and fragmented. The aft spinner plate showed a 5 inch long scrape in

the plane of rotation. All three propeller blades were in the low pitch position.

The ring cowling, bottom cowling, and bottom forward fuselage were crushed upward and aft. The side and upper cowlings were bent aft and broken open. The airplane's firewall and forward main fuel tank were crushed forward against the engine's accessories section. Three puncture holes, approximately 3-inches in diameter, were observed in the top front of the firewall through into the forward main fuel tank. The main landing gear legs were bent aft. The front of the left and right wheel pants were crushed. The main gear tires and brakes were intact.

The airplane's canopy was broken aft and away from the fuselage. The canopy frame was located 12 feet east-northeast of the main wreckage. The Plexiglas was broken out and fragmented. The canopy frame was bent and twisted.

The front cockpit right side wall and fuselage frame tubing in that area were bent downward and crushed aft. The left wall was broken open and outward, and crushed aft. The front cockpit floor and pilot seat pan were bent upward. The front cockpit instrument panel was bent forward and crushed downward. Most of the flight instruments in the forward instrument panel were broken out and destroyed.

The surviving engine instrument from the front cockpit instrument panel showed the following indication:

Tachometer: 1,950 revolutions per minute

The rear cockpit walls and floor showed skin wrinkling. The rear pilot seat was intact. The shoulder harness was broken at the frame attach point. The rear cockpit instrument panel was bent forward in the middle. Most of the flight and engine instruments were intact. The bulkhead separating the front and rear cockpits was bent forward into the front pilot seat.

Flight instruments from rear cockpit instrument panel showed the following indications:

Airspeed indicator: 95 miles per hour
Altimeter: 5,345 feet
Kollsman window: 29.97 inches of Mercury (Hg)
Accelerometer: destroyed

Engine instruments from the rear cockpit instrument panel showed the following indications:

Tachometer: 2,450 revolutions per minute
Hobbs meter: 261.05 hours
Manifold pressure: 26 inches Hg
Oil pressure: destroyed
Oil temperature: destroyed

Exhaust gas temperature indicator:  destroyed
Ammeter:  broken, needle read zero

Engine controls at the rear cockpit were observed at the following positions:

Throttle:  full open
Mixture:  full rich
Starter switch:  both
Cowl flaps:  intermediate position between open and closed
Carburetor Heat:  intermediate position between open and full cold
Fuel Selector:  Main tank selected
Auxiliary fuel tank selector:  Off

The top wing was broken forward at the over-fuselage and outboard wing struts.  The top wing was also broken longitudinally into two pieces at the center, exposing the wing fuel tank.  The fuel tank was intact and showed no evidence of fuel.  The leading edge of the wing was crushed aft approximately 8 inches along its entire span.  The fabric wing skin was torn longitudinally near the wing tips.  Several of the wood ribs were crushed and fragmented.  The tie-bar to the top right aileron was broken at the bottom wing attachment.  The top left and right ailerons were intact.
The left bottom wing was attached to the airplane's fuselage, but broken upward and aft at the root.  The leading edge of the wing was crushed upward and aft approximately 4 to 6 inches along its entire span.  The upper wing fabric was torn longitudinally in several places near the wing tip.  The bottom skin was crushed upward and wrinkled.  The bottom wing left aileron was intact.  The tie-bar to the top wing left aileron was attached.  Flight control continuity to the left ailerons was confirmed.

The right bottom wing remained attached to the airplane's fuselage.  The leading edge of the wing was crushed upward and aft approximately 4 inches along its entire span.  The upper wing fabric was torn longitudinally in several places from the root to the tip.  The bottom skin was wrinkled and torn.  The bottom wing left aileron was intact.  Flight control continuity to the right ailerons was confirmed.

The aft fuselage was intact and twisted approximately 20 degrees counter-clockwise just aft of the rear cockpit seat bulkhead.  The right side of the aft fuselage skin was wrinkled.

The airplane's empennage was intact.  The vertical stabilizer and rudder showed no damage.  The left horizontal stabilizer and elevator showed no damage.  The right horizontal stabilizer was wrinkled near the tip.  The left elevator was wrinkled and bent upward.  Both elevator trim tabs were observed to be 25 degrees up from the neutral position.  Flight control continuity to the elevators and rudder were confirmed.  The airplane's tail wheel was undamaged.  The tail wheel strut was displaced slightly to the left of the fuselage centerline.

A debris field extended aft and north of the main wreckage.  The debris field described a 90-

degree arc that extended 32 feet behind the main wreckage and 19 feet north of the main wreckage. The debris field contained the canopy frame, pieces of broken clear Plexiglas, cowling pieces, red and white paint chips, pieces of broken wing ribs, wood shards from the propeller, and personal effects.

A field examination of the airplane's systems showed no anomalies that could have contributed to the accident. The airplane's engine and propeller remains were retained for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies of the two pilots were conducted by the Boulder County Medical Examiner at Boulder, Colorado, on April 27, 2003.

The results of FAA toxicology testing of specimens taken from the commercial pilot were negative for all tests conducted.

The results of FAA toxicology testing of specimens taken from the private pilot were negative for all tests conducted.

TESTS AND RESEARCH

The airplane's engine was examined at Greeley, Colorado, on April 30, 2003. The examination showed no fuel in the fuel distribution manifold, distribution lines, nozzles, fuel filter, or in the fuel lines from the main fuel tank to the engine fuel pumps. Approximately 0.10 ounces of fuel was retrieved from the engine driven fuel pump. The fuel boost pump was broken aft and showed no evidence of fuel. All other engine components examined and tested revealed no pre-impact anomalies.

According to the airplane flight manual, the airplane has a total fuel capacity of 29 U. S. gallons. The flight manual states that 28 gallons are usable during all normal flight conditions. The manual also states that of the 24 gallons of fuel in the main tank, 15 gallons are usable for aerobatic flight. The manual states, "Of the 5 gallons in the auxiliary (wing) tank, none are usable for aerobatic flight. The wing tank is usable for cross country flight only."

According to the engine manufacturer, the airplane's engine can use as much as 18 gallons per hour when performing aerobatic maneuvers.

ADDITIONAL INFORMATION

Parties to the investigation were the FAA Flight Standards District Office, Denver, Colorado, and Textron Lycoming.

All aircraft wreckage was released and returned to Beegles Aircraft, Incorporated, Greeley,

Colorado.

## Pilot Information

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| **Certificate:** | Private | **Age:** | 57,Male |
| **Airplane Rating(s):** | Single-engine land; Multi-engine land | **Seat Occupied:** | Rear |
| **Other Aircraft Rating(s):** | Glider | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 3 Valid Medical--w/ waivers/lim | **Last FAA Medical Exam:** | September 21, 2001 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | May 9, 2002 |
| **Flight Time:** | 2408 hours (Total, all aircraft), 105 hours (Total, this make and model), 2250 hours (Pilot In Command, all aircraft), 23 hours (Last 90 days, all aircraft), 2 hours (Last 24 hours, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Christen Industries | **Registration:** | N399DB |
| **Model/Series:** | Pitts S-2B | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Aerobatic | **Serial Number:** | 5137 |
| **Landing Gear Type:** | Tailwheel | **Seats:** | 2 |
| **Date/Type of Last Inspection:** | November 11, 2002 Annual | **Certified Max Gross Wt.:** | 1182 lbs |
| **Time Since Last Inspection:** | 44.85 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 261.05 Hrs | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Installed, activated, did not aid in locating accident | **Engine Model/Series:** | AEIO-540-D4A5 |
| **Registered Owner:** | Connair, Inc. | **Rated Power:** | 260 Horsepower |
| **Operator:** | | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | FNL,5016 ft msl | **Distance from Accident Site:** | 14 Nautical Miles |
| **Observation Time:** | 12:15 Local | **Direction from Accident Site:** | 6° |
| **Lowest Cloud Condition:** | Few / 9000 ft AGL | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 4 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 80° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.69 inches Hg | **Temperature/Dew Point:** | 12°C / 7°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Boulder, CO (1V5 ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | | **Type of Clearance:** | None |
| **Departure Time:** | 10:00 Local | **Type of Airspace:** | Class G |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | 1 Fatal | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 2 Fatal | **Latitude, Longitude:** | 40.233333,-105.150001 |

## Administrative Information

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| **Investigator In Charge (IIC):** | Bowling, David |
| **Additional Participating Persons:** | Gregory Zadar; Federal Aviation Administration; Denver, CO<br>John B Butler; Textron Lycoming; Arlington, TX |
| **Original Publish Date:** | November 25, 2003 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | The NTSB traveled to the scene of this accident. |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=56893 |