# Aviation Investigation Final Report

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| **Location:** | Somerset, Pennsylvania | **Accident Number:** | NYC06LA112 |
| **Date & Time:** | May 10, 2006, 15:25 Local | **Registration:** | N5473 |
| **Aircraft:** | Bulmer Lancair IV-P | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | | **Injuries:** | 2 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Positioning | | |

## Analysis

The experimental airplane had accrued 27 hours of total flight time, and had just completed its 25-hour Phase I flight testing period. Witnesses related that they saw the airplane engine start, and that the crew appeared to go through an extensive series of checks for approximately 10 minutes prior to takeoff. The engine idled smoothly, and was accelerated several times prior to taxi, once to full power. At takeoff, with a tailwind, the airplane accelerated smoothly, and rotated at a point along the runway that the witnesses thought was later than usual. The airplane pitched nose-up about 20 to 30 degrees in the climb, and the landing gear retracted. When the airplane reached treetop height, black smoke trailed from the engine exhaust system, and the engine "sputtered." The airplane entered a smooth roll to the left, yawed left, and then "plunged" to the ground, in a near vertical attitude. Witnesses said the turn after the loss of engine power was performed at a very high deck angle. Examination of data extracted from the airplane's electronic flight instrumentation system revealed that during the takeoff roll, the fuel flow was more than 20 percent above maximum, and the propeller was over-speeding. The engine rpm, fuel flow, and "Engine" warnings on the multi-function displays should have been visible to the crew. Examination of flight data revealed that the airplane continued to pitch-up as high as 22 degrees, as altitude decreased and airspeed decayed. Examination of the cockpit schematic revealed that the auxiliary fuel pump "high boost/low boost" switch was positioned next to the "Nav" lighting switch. In the airplane's "Before Takeoff" checklist, the "Lights-as required" task was to be performed four tasks prior to the "Takeoff" checklist.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain sufficient airspeed after takeoff to preclude a stall, which

resulted in a loss of control and an inadvertent stall.  Factors associated with the accident are the inadvertent stall, the loss of engine power due to the pilot's inadvertent activation of the high pressure auxiliary fuel pump, and the pilot's failure to abort the takeoff after receiving abnormal engine and fuel flow warnings on the primary flight display.

## Findings

Occurrence #1: LOSS OF ENGINE POWER(PARTIAL) - NONMECHANICAL
Phase of Operation: TAKEOFF - ROLL/RUN

Findings
1. (F) FUEL SYSTEM,ELECTRIC BOOST PUMP - OUTPUT HIGH
2. (F) ABORTED TAKEOFF - NOT PERFORMED - PILOT IN COMMAND
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Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
3. (C) AIRSPEED(VS) - NOT MAINTAINED - PILOT IN COMMAND
4. (F) STALL - INADVERTENT - PILOT IN COMMAND
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Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
5. TERRAIN CONDITION - GRASS

## Factual Information

HISTORY OF FLIGHT

On May 10, 2006, at 1525 eastern daylight time, an amateur-built Lancair IV-P, N5473, was destroyed following an uncontrolled descent after takeoff from runway 7 at Somerset County Airport (2G9), Somerset, Pennsylvania. Both certificated commercial pilots were fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the ferry flight conducted under 14 CFR Part 91.

The purpose of the flight was to deliver the airplane to its owner on the west coast; however, the planned stopover destinations could not be determined.

Several witnesses observed the accident flight, and their versions of the event remained consistent. According to the witnesses, the airplane engine started, and the crew appeared to go through an extensive series of checks for approximately 10 minutes prior to takeoff. The engine idled smoothly, and was accelerated several times prior to taxi, once to full power. The engine ran smoothly and without interruption throughout the pre-takeoff checks.

At takeoff, the airplane accelerated smoothly, and rotated at a point along the runway that was "later than usual." The airplane pitched nose-up about "20 to 30 degrees" in the climb, and the landing gear retracted. When the airplane reached treetop height, black smoke trailed from the engine exhaust system, the engine "sputtered," and then stopped producing power.

The airplane entered a "smooth roll" to the left, yawed left, and then "plunged" to the ground, near vertically. The witnesses said the turn after the loss of engine power, was performed at a "very high deck angle."

The accident occurred during the hours of daylight approximately 39 degrees, 14 minutes north latitude, and 76 degrees, 31 minutes west longitude.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with ratings for airplane single-engine land, and instrument airplane. The pilot had accrued 2,571 total hours of flight experience, with 500 hours in make and model. His most recent Federal Aviation Administration (FAA) second-class medical certificate was issued in October 2005.

The copilot held a commercial pilot certificate with ratings for airplane single engine land, multi-engine land, and instrument airplane. He also held a flight engineer certificate with a rating for turbojet airplanes. The copilot had accrued 5,585 total hours of flight experience.

His most recent FAA third-class medical certificate was issued in December 2005.

## AIRCRAFT INFORMATION

Examination of the aircraft logbooks revealed that the airplane had accrued 27 total hours of flight time, and the most recent airworthiness inspection was completed on July 31, 2005. The 25-hour Phase I flight testing period, as prescribed by the Operating Limitations outlined by the FAA Manufacturing and Inspection District Office, New Cumberland, Pennsylvania, had just been completed.

## METEOROLOGICAL INFORMATION

At 1454, the weather reported at the Johnstown-Cambria Airport, Johnstown, Pennsylvania, 19 miles northeast, included visibility 10 miles, clear skies, and winds from 200 degrees at 8 knots. The temperature was 71 degrees Fahrenheit, and the dew point was 35 degrees Fahrenheit.

## WRECKAGE AND IMPACT INFORMATION

The airplane was examined and photographed at the site by FAA aviation safety inspectors, and all major components were accounted for at the scene. The initial ground scar was 50 feet beyond the departure end of the runway, and 200 feet left of centerline.

The airplane came to rest on its right side facing opposite the direction of travel. The nose, engine, cockpit, and cabin areas were destroyed by impact, and fragments of composite materials were scattered in a wide arc beyond the wreckage.

The engine came to rest inverted and displayed impact damage to the intake and exhaust tubes. The oil pan was crushed. The number 3 and number 5 cylinders displayed impact damage and appeared displaced.

The spark plugs were removed, and the electrodes were dark and soot covered.

The engine crankshaft was rotated by hand at the propeller, and continuity was confirmed through the powertrain, valvetrain, and accessory sections. Compression was confirmed on all but the number 5 cylinder, using the thumb method. The fuel pump ejected fuel when actuated. Field tests could not be completed on either magneto due to impact damage.

The engine examination was suspended, and the engine and its accessories were moved to an engine overhaul facility in Mattituck, New York, for further examination.

## TESTS AND RESEARCH

The engine was examined in Mattituck, New York, on August 22, 2006. A complete

disassembly of the engine revealed no abnormal wear or mechanical deficiency.

Electrical power was applied to the auxiliary fuel pump and the motor ran at high rpm and pumped liquid at a constant rate.

The pump was forwarded to the manufacturer and bench tested. Test results revealed that the pump operated at the proper flow rates in both the high and low settings.

The airplane was equipped with a Chelton Flight Systems Electronic Flight Instrumentation System (EFIS).

FAA inspectors recovered the non-volatile memory from the EFIS, and forwarded it to Chelton Flight Systems for data recovery. The last flight, and four previous "power-ups" of the system, was recovered. No previous flights were recovered.

The data was then downloaded into a software program that re-created the accident flight on simulated primary flight and engine instrument displays, as viewed by the pilot.

Examination of the data revealed that the engine rpm and fuel flow limits were exceeded during the ground roll prior to takeoff. Once these limits were exceeded, the fuel flow peaked between 52 and 53 gallons per hour and remained there for the duration of the takeoff, the manifold pressure peaked and remained between 38.7 and 38.9 inches of Hg., while the propeller rpm fluctuated between 2,730 and 3,190 rpm.

The maximum rated propeller speed for the Continental TSIO-550-E was 2,700 rpm. The maximum fuel flow was 41.7 to 43.4 gallons per hour.

Examination of the flight data revealed that, early in the climb the airplane achieved positive climb rates of between 1,400 and 1,700 feet per minute, at speeds between 73 and 83 knots. Once the pitch-up attitude continued beyond 13.7 degrees, the positive climb rate diminished, and beyond 17.7 degrees, the airplane entered a descent, yet continued to increase nose-up pitch. The data showed that the airplane reached a maximum pitch-up attitude of 22.3 degrees, as it descended straight ahead for several seconds, while the propeller speed and fuel flow rate remained well above the maximum.

A review of the computer simulation revealed that during the takeoff roll, when the fuel flow exceeded the maximum, the fuel-flow needle and gauge, as well as the tachometer needle and gauge, flashed on the multi-function display. These events were followed immediately by an "Engine" warning illumination on the primary flight display.

According to the airplane's checklist, a normal takeoff was performed by a nosewheel "lift at 65 knots." Best angle of climb (Vx) was 110 knots with 10 degrees of flaps, and best rate of climb (Vy), was 135 knots with flaps retracted.

Examination of the data revealed that the airplane reached a top speed of 86 knots, at which point the rate of climb became a negative number. From that point, the airplane decelerated and descended until ground contact.

MEDICAL AND PATHOLOGICAL INFORMATION

The Somerset County Coroner, Johnstown, Pennsylvania, performed autopsies on both pilots on May 11, 2006.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing on both pilots.

ADDITIONAL INFORMATION

Examination of the cockpit schematic revealed that the auxiliary fuel pump "high boost/low boost" switch was positioned next to the "Nav" lighting switch on the instrument panel. According to the airplane's "Before Takeoff" checklist, the "Lights-as required" task was performed four tasks prior to the "Takeoff" checklist.

According to the aircraft checklist, auxiliary fuel boost pressure was only used above 10,000 feet for climb or cruise, and at the "Low" setting. "High" auxiliary fuel boost pressure was only used "momentarily" in the event of an engine failure, "to check for engine driven fuel pump failure."

## Pilot Information

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| **Certificate:** | Commercial | **Age:** | 53,Male |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | Yes |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 2 Without waivers/limitations | **Last FAA Medical Exam:** | October 1, 2005 |
| **Occupational Pilot:** | UNK | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 2571 hours (Total, all aircraft), 500 hours (Total, this make and model) | | |

## Co-pilot Information

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| **Certificate:** | Commercial; Flight engineer | **Age:** | 59,Male |
| **Airplane Rating(s):** | Single-engine land; Multi-engine land | **Seat Occupied:** | Right |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | Yes |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 3 Without waivers/limitations | **Last FAA Medical Exam:** | December 1, 2005 |
| **Occupational Pilot:** | UNK | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 5585 hours (Total, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Bulmer | **Registration:** | N5473 |
| **Model/Series:** | Lancair IV-P | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | Yes |
| **Airworthiness Certificate:** | Experimental (Special) | **Serial Number:** | LIV-473 |
| **Landing Gear Type:** | Retractable - Tricycle | **Seats:** | 4 |
| **Date/Type of Last Inspection:** | July 1, 2005 Continuous airworthiness | **Certified Max Gross Wt.:** | 3550 lbs |
| **Time Since Last Inspection:** | 27 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 27 Hrs at time of accident | **Engine Manufacturer:** | Continental |
| **ELT:** | Installed, not activated | **Engine Model/Series:** | TSIO-550-E |
| **Registered Owner:** | N5473 LLC | **Rated Power:** | 350 Horsepower |
| **Operator:** | | **Operating Certificate(s) Held:** | None |
| **Operator Does Business As:** | N5473 LLC | **Operator Designator Code:** | |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | JST,2272 ft msl | **Distance from Accident Site:** | 19 Nautical Miles |
| **Observation Time:** | 14:54 Local | **Direction from Accident Site:** | 45° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 8 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 200° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.84 inches Hg | **Temperature/Dew Point:** | 22°C / 1°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | SOMERSET, PA (2G9 ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | | **Type of Clearance:** | None |
| **Departure Time:** | 15:25 Local | **Type of Airspace:** | |

## Airport Information

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| **Airport:** | Somerset County Airport 2G9 | **Runway Surface Type:** | Asphalt |
| **Airport Elevation:** | 2272 ft msl | **Runway Surface Condition:** | Dry |
| **Runway Used:** | 06 | **IFR Approach:** | None |
| **Runway Length/Width:** | 4697 ft / 75 ft | **VFR Approach/Landing:** | None |

## Wreckage and Impact Information

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| **Crew Injuries:** | 2 Fatal | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 2 Fatal | **Latitude, Longitude:** | 40.038887,-79.014442 |

## Administrative Information

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| **Investigator In Charge (IIC):** | Rayner, Brian |
| **Additional Participating Persons:** | Stuart Beck; FAA/FSDO; West Mifflin, PA<br>Greg Schmidt; Teledyne Continental; Mobile, AL |
| **Original Publish Date:** | May 29, 2007 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=63666 |