



# National Transportation Safety Board Aviation Accident Final Report

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|--------------------------------|--------------------------------------|-------------------------|-------------|
| <b>Location:</b>               | SALEM, OR                            | <b>Accident Number:</b> | SEA00LA079  |
| <b>Date &amp; Time:</b>        | 05/01/2000, 0818 PDT                 | <b>Registration:</b>    | N1143L      |
| <b>Aircraft:</b>               | MORTON CHRISTAVIA MARK I             | <b>Aircraft Damage:</b> | Substantial |
| <b>Defining Event:</b>         |                                      | <b>Injuries:</b>        | 1 None      |
| <b>Flight Conducted Under:</b> | Part 91: General Aviation - Personal |                         |             |

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## Analysis

The pilot/builder of the kitplane took off from runway 13 on the aircraft's initial test flight and immediately encountered a nose heavy condition. He declared an emergency and maneuvered to land on runway 34. He reported that during his approach the aircraft was controllable as long as power was applied, but on short final he instinctively reduced power and the nose of the aircraft abruptly pitched down. The aircraft then impacted the ground and slid up onto the runway. The center of gravity range limits had been calculated by the pilot/builder as between 10.5 to 19.5 inches with the aircraft's empty weight CG at 11.0 inches. Following the calculations, the pilot/builder changed the aircraft's battery (located forward of the cockpit) which added 7 pounds, and added a new engine exhaust system adding 2-3 additional pounds. A new CG was not calculated. Center of gravity calculations based on the earlier weight/CG of the aircraft, including the weight of the pilot and the 96 pounds of fuel also placed the CG 0.5 inch forward of the old forward limit.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot/builder's failure to correct the center of gravity computations after a weight increase. A contributing factor was the pilot/builder's exceeding the forward CG limit in fuel weight, of which both conditions resulted in a degradation of aircraft control.

## Findings

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Occurrence #1: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: APPROACH - VFR PATTERN - FINAL APPROACH

### Findings

1. (C) AIRCRAFT WEIGHT AND BALANCE - NOT CORRECTED - PILOT IN COMMAND
2. (F) AIRCRAFT WEIGHT AND BALANCE - EXCEEDED - PILOT IN COMMAND
3. AIRCRAFT CONTROL - DIMINISHED

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Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

## Factual Information

On May 1, 2000, at 0818 Pacific daylight time, an experimental Morton Christavia Mark I kitplane, N1143L, registered to, and constructed and being flown by a private pilot, was substantially damaged during an in-flight collision with terrain following a loss of control while on short final to runway 34, at McNary Field, Salem, Oregon. The pilot was uninjured. Visual meteorological conditions existed, and no flight plan had been filed. The flight, which was a maintenance check flight, was to have been operated under 14CFR91, and originated from McNary Field at 0816.

According to tower personnel, the pilot radioed that the aircraft had a brand new engine installed and was on a maintenance check flight. Immediately after takeoff from runway 13, the pilot declared an emergency and was cleared to land on runway 34. The controller reported that on short final the aircraft suddenly pitched nose down and impacted terrain. The airport manager examined the impact site and reported that the aircraft impacted terrain 281 feet short of the threshold, skidded up on to the runway tearing out a runway threshold light, and then came to rest along the east edge of the runway 236 feet north of the threshold. Both main landing gear were torn off and slash marks characteristic of propeller strikes were observed in the soil immediately following the initial ground impact.

The pilot reported that he took off from Salem on the initial test flight for the aircraft and experienced a nose-heavy condition during climb out. He requested immediate clearance to return and land and turned back toward the field. He reported that he "needed power for control and while trying to make [a] wheel landing contacted [the] ground approximately 200 [feet] short of [the] runway end." During an interview with an inspector from the Federal Aviation Administration's Hillsboro Flight Standards District Office, the pilot reported that during his approach the aircraft was controllable as long as power was applied, and that on short final he instinctively reduced the power for landing and the nose of the aircraft abruptly pitched down. He was unable to recover control prior to the ground impact.

According to the center of gravity (CG) calculations provided by the pilot/builder, the aircraft's empty weight was 1,053 pounds and its arm was 11.0 inches. The arm for the forward pilot seat was 18 inches and the arm for the forward mounted fuel tank was -15 inches. The documentation provided also indicated that the forward CG limit was 10.5 inches and the aft limit was 19.5 inches.

The CG at the time of the accident was calculated for the aircraft based on the previous information, plus a weight of 170 pounds for the pilot from his most recent medical examination, and the pilot's reported total of 16 gallons of aviation fuel (96 pounds) aboard at takeoff, as follows:

|             |        |             |           |           |             |             |        |    |       |   |
|-------------|--------|-------------|-----------|-----------|-------------|-------------|--------|----|-------|---|
| WEIGHT      | ARM    | MOMENT      | ACFT      | WT        | 1,053 lb    | 11 inches   | 11,583 |    |       |   |
| inch-pounds | PILOT  | WT          | 170 lb    | 18 inches | 3,060       | inch-pounds | FUEL   | WT | 96 lb | - |
| 15 inches   | -1,440 | inch-pounds |           |           |             |             |        |    |       |   |
| TOTAL       | WT     | 1,319 lb    | 10 inches | 13,203    | inch-pounds |             |        |    |       |   |

The center of gravity under these conditions (10 inches) would lie one-half inch forward of the forward most CG limit.

In a telephone conversation with the pilot/builder, he reported that after having worked up the

basic aircraft CG figures he then made two changes within the aircraft. The first was the replacement of the aircraft battery with a larger unit weighing 7 pounds more than the former battery. The battery was located forward of the cockpit. The second was the replacement of the engine exhaust assembly with a newer, stainless steel system which weighed 2 to 3 pounds more than the former. These two changes would have changed the aircraft CG, making the aircraft more nose heavy.

The pilot/builder reported on his submitted NTSB Form 6120.1/2 under the "Recommendation" section that "closer attention by [the] builder to COG due to heavier equipment being placed after [the] COG [was] figured - builder's failure to re-work COG figures."

### Pilot Information

|                                  |   |  |                            |
|----------------------------------|---|--|----------------------------|
| <b>Certificate:</b>              | Private   | <b>Age:</b>                              | 70, Male                   |
| <b>Airplane Rating(s):</b>       | Single-engine Land  | <b>Seat Occupied:</b>                    | Front                      |
| <b>Other Aircraft Rating(s):</b> | None  | <b>Restraint Used:</b>                   | Seatbelt, Shoulder harness |
| <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>    | Class 3 Valid Medical--w/ waivers/lim.                                      | <b>Last FAA Medical Exam:</b>            | 04/11/2000                 |
| <b>Occupational Pilot:</b>       |   | <b>Last Flight Review or Equivalent:</b> |                            |
| <b>Flight Time:</b>              | 624 hours (Total, all aircraft), 624 hours (Pilot In Command, all aircraft) |  |                            |

### Aircraft and Owner/Operator Information

|                                      |                                 |                                       |                 |
|--------------------------------------|---------------------------------|---------------------------------------|-----------------|
| <b>Aircraft Make:</b>                | MORTON                          | <b>Registration:</b>                  | N1143L          |
| <b>Model/Series:</b>                 | CHRISTAVIA MARK I<br>CHRISTAVIA | <b>Aircraft Category:</b>             | Airplane        |
| <b>Year of Manufacture:</b>          |                                 | <b>Amateur Built:</b>                 | Yes             |
| <b>Airworthiness Certificate:</b>    | Experimental                    | <b>Serial Number:</b>                 | 2               |
| <b>Landing Gear Type:</b>            | Tailwheel                       | <b>Seats:</b>                         | 2               |
| <b>Date/Type of Last Inspection:</b> | Unknown                         | <b>Certified Max Gross Wt.:</b>       | 1500 lbs        |
| <b>Time Since Last Inspection:</b>   | 0 Hours                         | <b>Engines:</b>                       | 1 Reciprocating |
| <b>Airframe Total Time:</b>          |                                 | <b>Engine Manufacturer:</b>           | Lycoming        |
| <b>ELT:</b>                          | Installed, not activated        | <b>Engine Model/Series:</b>           | O-235           |
| <b>Registered Owner:</b>             | MORTON, JOHN, W.                | <b>Rated Power:</b>                   | 108 hp          |
| <b>Operator:</b>                     | MORTON, JOHN, W.                | <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: | SLE, 210 ft msl   | Distance from Accident Site:            | 0 Nautical Miles |
| Observation Time:                | 0756 PDT          | Direction from Accident Site:           | 0°               |
| Lowest Cloud Condition:          | Clear / 0 ft agl  | Visibility                              | 10 Miles         |
| Lowest Ceiling:                  | None / 0 ft agl   | Visibility (RVR):                       | 0 ft             |
| Wind Speed/Gusts:                | 7 knots /         | Turbulence Type<br>Forecast/Actual:     | /                |
| Wind Direction:                  | 120°              | Turbulence Severity<br>Forecast/Actual: | /                |
| Altimeter Setting:               | 30 inches Hg      | Temperature/Dew Point:                  | 12° C / 6° C     |
| Precipitation and Obscuration:   |                   |   |                  |
| Departure Point:                 | (SLE)             | Type of Flight Plan Filed:              | None             |
| Destination:                     |                   | Type of Clearance:                      |                  |
| Departure Time:                  | 0816 PDT          | Type of Airspace:                       | Class D          |

## Airport Information

|                      |                    |                           |   |
|----------------------|--------------------|---------------------------|---|
| Airport:             | MCNARY FIELD (SLE) | Runway Surface Type:      | Asphalt                                   |
| Airport Elevation:   | 210 ft             | Runway Surface Condition: | Dry                                       |
| Runway Used:         | 34                 | IFR Approach:             | None                                      |
| Runway Length/Width: | 5145 ft / 140 ft   | VFR Approach/Landing:     | Precautionary Landing;<br>Traffic Pattern |

## 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: |             |

## Administrative Information

|                                   |  |              |            |
|-----------------------------------|--|--------------|------------|
| Investigator In Charge (IIC):     | STEVEN A MCCREARY  | Report Date: | 12/04/2000 |
| Additional Participating Persons: | PINAR CRANE; HILLSBORO, OR   |              |            |
| Publish Date:                     |  |              |            |
| Investigation Docket:             | NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> . |              |            |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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](#).