National Transportation Safety Board
Aviation Accident Data Summary

Location:	Antelope Island, UT	**Accident Number:**	WPR09FA141
Date & Time:	03/03/2009, 0840 MST	**Registration:**	N3683X
Aircraft:	STEPHENSON ZODIAC 601 XL	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

Radar data and a performance study depicted the airplane flying on a steady northerly course adjacent to mountains at 113 knots calibrated airspeed. The pilot changed course slightly to fly close to or over the mountains. The airplane subsequently experienced an in-flight breakup. All of the airplane's structural components and flight control surfaces were located at the main impact site. There was no evidence of excessive airspeed or maneuvers that would lead to a structural overload and failure of the wings. Turbulence was present in the area, although it was not believed to be severe and likely did not contribute to the failure.

An examination of the airplane wreckage revealed that the left wing spar had buckled upward near the fuselage and the left wing had wrapped around the fuselage near the cockpit. There was compression buckling of the lower spar cap of the left wing's rear spar and compression buckling of the upper and lower spar caps of the right wing's rear spar. The compression damage to both rear spars and the upward buckling of the left wing's main spar are evidence of upward and downward bending of both wings. The upward and downward bending of the wings is consistent with aerodynamic flutter. The structural loading at the inboard section of the left wing was further increased as the trailing edges of the outboard sections moved up and down. Ultimately the left wing failed as it bent upward near the root. Aerodynamic flutter can occur when there is insufficient stiffness in the structure or when the flight controls are not mass-balanced. Counterbalanced flight controls can protect less stiff surfaces at higher airspeeds. The ailerons did not have counterbalances, which would have offered direct protection from aerodynamic flutter.

Flight Events

Enroute-cruise - Aircraft structural failure
Enroute-cruise - Loss of control in flight
Uncontrolled descent - Collision with terr/obj (non-CFIT)

Probable Cause

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The in-flight failure of both wings due to aileron flutter. The aileron flutter was the result of inadequate wing stiffness and the lack of aileron counterbalances.

Findings

Aircraft-Aircraft structures-Wing structure-(general)-Failure - C
Aircraft-Aircraft structures-Wing structure-(general)-Design - C
Aircraft-Aircraft structures-Wing structure-Ailerons-Failure - C
Aircraft-Aircraft structures-Wing structure-Ailerons-Design - C

Pilot Information

Certificate:	Commercial	**Age:**	37
Airplane Rating(s):	Multi-engine Land; Single-engine Sea	**Instrument Rating(s):**	Airplane
Other Aircraft Rating(s):	None	**Instructor Rating(s):**	None
Flight Time:	350 hours (Total, all aircraft), 14 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	STEPHENSON	**Registration:**	N3683X
Model/Series:	ZODIAC 601 XL	**Engines:**	1 Reciprocating
Operator:	Kirk Babbitt	**Engine Manufacturer:**	Jabiru
Air Carrier Operating Certificate:	None	**Engine Model/Series:**	3300
Flight Conducted Under:	Part 91: General Aviation - Personal		

Meteorological Information and Flight Plan

Observation Facility, Elevation:	KSLC, 4220 ft msl	**Weather Information Source:**	Weather Observation Facility
Conditions at Accident Site:	Visual Conditions	**Lowest Ceiling:**	Broken / 20000 ft agl
Condition of Light:	Day	**Wind Speed/Gusts, Direction:**	17 knots, 160°
Temperature:	13°C / 0°C	**Visibility**	10 Miles
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tooele, UT (KTVY)	**Destination:**	Bountiful, UT (BTF)

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None

Administrative Information

Investigator In Charge (IIC):	Dennis J Hogenson	**Adopted Date:**	11/29/2011
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 pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		

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