Aviation Investigation Final Report

Location:	Rexburg, Idaho	**Accident Number:**	WPR12LA265
Date & Time:	June 15, 2012, 19:40 Local	**Registration:**	N106BD
Aircraft:	ROETMAN RYLAND K JR EAGLE	**Aircraft Damage:**	Substantial
Defining Event:	Powerplant sys/comp malf/fail	**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Air race/show		

Analysis

The airline transport pilot, who was also the owner/ builder of the experimental aerobatic airplane, was practicing aerobatic maneuvers for an upcoming airshow. An amateur video captured a portion of the flight and accident sequence. The video shows the airplane conducting several continuous right rolls at an approximate constant altitude and pitch attitude. During the accident sequence, the airplane continued to roll, but it began to descend while maintaining a relatively level pitch attitude. When the airplane was about 100 ft above the ground, it stopped rolling and then continued to descend in a significant right-wing-down attitude. Examinations of the wreckage did not reveal any preimpact mechanical deficiencies or failures that would have precluded continued flight; however, no detailed examinations of the wreckage or any components were conducted.

The pilot reported that, while conducting the maneuver just before the accident, he "heard and felt" an uncommanded decrease in rpm, which he believed was caused by the decrease in engine oil pressure that occurs during aerobatics, and a subsequent uncommanded change in propeller blade pitch. Based on the available evidence, it is likely that, during the aerobatic maneuver, the airplane lost oil pressure, which resulted in a decrease in thrust and change in propeller blade pitch, and that the airplane had insufficient power and altitude for the pilot to recover from the maneuver. The pilot reported that he had installed an accumulator to prevent the decrease in engine oil pressure; it could not be determined why the accumulator did not function during the accident flight.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

A loss of engine oil pressure, which led to the subsequent uncommanded loss of thrust and decrease in the propeller rpm during a low-level aerobatic maneuver.

Findings

Aircraft	Oil - Not specified
Aircraft	(general) - Not specified
Aircraft	Propeller governor - Not specified
Aircraft	Altitude - Attain/maintain not possible

Factual Information

History of Flight

Maneuvering-aerobatics	Powerplant sys/comp malf/fail (Defining event)
Maneuvering-aerobatics	Collision with terr/obj (non-CFIT)

On June 15, 2012, about 1940 mountain daylight time, an experimental amateur-built Roetman Eagle, N106BD, was substantially damaged when it impacted terrain while conducting aerobatic maneuvers at the Rexburg-Madison County Airport (RXE), Rexburg, Idaho. The pilot/owner sustained serious injuries, and there were no ground injuries. The airplane was being operated under the provision of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed for the local area flight, and no flight plan had been filed.

The flight originated at RXE, and the pilot was practicing for an upcoming airshow at that airport. The airplane was recovered for potential further examination.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	54,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	May 1, 2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	January 31, 2012
Flight Time:	14223 hours (Total, all aircraft), 1500 hours (Total, this make and model), 12181 hours (Pilot In Command, all aircraft), 115 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Federal Aviation Administration (FAA) records indicated that the pilot held airline transport and flight instructor certificates, with multiple ratings, and a mechanic certificate with airframe and powerplant ratings.

According to information provided by the pilot, he had approximately 14,223 total hours of flight experience, including approximately 1,500 hours in the accident airplane make and model. His most recent flight review was completed in January 2012, and his most recent FAA first-class medical certificate was issued in May 2012.

Aircraft and Owner/Operator Information

Aircraft Make:	ROETMAN RYLAND K JR	**Registration:**	N106BD
Model/Series:	EAGLE	**Aircraft Category:**	Airplane
Year of Manufacture:	2003	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	BR001
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	June 2, 2012	**Certified Max Gross Wt.:**	1600 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1271 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Not installed	**Engine Model/Series:**	IO-360 SER
Registered Owner:	On file	**Rated Power:**	240 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

FAA records indicated that the biplane was built in 2003 by the pilot/owner. It was equipped with a Lycoming IO-360 series engine, and a variable pitch 3-blade MT-9-190 composite propeller. It had an enclosed cockpit, and conventional-style landing gear.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RXE,4862 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	19:53 Local	**Direction from Accident Site:**	0°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.1 inches Hg	**Temperature/Dew Point:**	22°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Rexburg, ID (RXE)	**Type of Flight Plan Filed:**	None
Destination:	Rexburg, ID (RXE)	**Type of Clearance:**	None
Departure Time:	19:30 Local	**Type of Airspace:**	

The RXE 1953 automated weather observation included wind from 180 degrees at 5 knots, visibility 10 miles, clear skies, temperature 22 degrees Celsius, dew point 1 degree Celsius, and

an altimeter setting of 30.00 inches of mercury.

Airport Information

Airport:	Rexburg-Madison County Airport RXE	**Runway Surface Type:**	
Airport Elevation:	4862 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

According to FAA information, RXE was equipped with a single paved runway, designated 17/35, that measured 4,204 feet by 75 feet. Airport elevation was 4,862 feet, and the airport was not equipped with an air traffic control tower.

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	43.833889,-111.805(est)

The airplane impacted a relatively level grassy area interspersed with a few trees, and was adjacent to the airport. The ground scars extended for a distance of approximately 120 feet.

The airplane came to rest upright. Both right wings sustained significant damage. Both main landing gear were collapsed, and all three blades of the wood/composite propeller were fracture-separated at or near the hub. The propeller hub remained attached to the engine, and the engine remained attached to its mounts. The engine mount and firewall were damaged and partially separated from the airplane. The aft fuselage and empennage were essentially intact, and the cockpit retained its integrity. There was no post impact fire.

Separate examinations of the airplane by FAA and insurance company personnel did not reveal any pre-impact mechanical deficiencies or failures. The NTSB did not conduct any examinations of the wreckage or any components.

Flight recorders

The airplane was equipped with a "Drift HD" recorder. The device was a portable, all-in-one recording unit utilizing a 170-degree lens, capable of recording high definition still and video images, and audio. The unit records to a removable micro SD card. The device was sent to the NTSB recorders laboratory in Washington, D.C., for readout. The SD card did not contain any data related to the accident flight.

Additional Information

Video Imagery

Amateur video footage taken from the ground, with duration of about 18 seconds, captured a portion of the flight and accident sequence. The footage was publicly available on the YouTube website. The video shows the airplane conducting multiple continuous right rolls at an approximately constant altitude, followed by an apparent slowing and descent of the airplane, while still rolling. The airplane maintained a relatively constant pitch attitude during the roll maneuvers, as well as, during both the horizontal and descending segments of the flight. The rolling ceased when the airplane was approximately 100 feet above the ground; however, the airplane continued in its descent in a significant right wing down attitude. The ground impact was mostly obscured from view by terrain. The majority of the footage did not contain any ground or other fixed features, so no trajectory information was able to be derived from the video.

Pilot-Provided Information

In several post-accident conversations with investigation personnel, the pilot provided description information for the airplane, and his opinion as to the cause of the accident.

The engine was equipped with a variable-pitch propeller that was controlled/actuated by a propeller governor, utilizing engine oil and engine oil pressure.

Occasionally, during certain aerobatic maneuvers, the engine oil pressure would decrease due to the loads and/or attitudes of those maneuvers. That decrease in oil pressure during those maneuvers sometimes resulted in uncommanded (by the pilot) and undesired propeller blade pitch increases (blades moving towards coarse pitch or feather position). About 4 years prior to the accident, the pilot installed an accumulator in the governor supply side oil line, in order to reduce or eliminate those occasional oil pressure drops from adversely affecting propeller blade pitch. The pilot did not install any gauges to indicate the pre-charge pressure in the accumulator, or any warning lights to signal a loss of accumulator pre-charge. The pilot reported that the accumulator system had performed reliably since its installation.

The pilot did not check the accumulator pre-charge pressure prior to any flight; in his experience, the system was sufficiently robust and reliable that the pre-charge was only checked during annual or other

detailed inspections.

While conducting the maneuver, just prior to the accident, the pilot "heard and felt" an uncommanded propeller rpm decrease. He concluded that the rpm loss was due to the expected decrease in engine oil pressure (from the maneuver), and the failure of the accumulator to provide sufficient oil pressure to prevent the propeller blades from increasing in pitch. The pilot also concluded that the accumulator failure was due to its loss of some or all of its pre-charge pressure. The pilot did not provide any basis for that assessment/conclusion.

Administrative Information

Investigator In Charge (IIC):	Cornejo, Tealeye
Additional Participating Persons:	David C Longan; Federal Aviation Administration; Salt Lake City, UT
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