Aviation Investigation Final Report

Location:	Fulton, New York	**Incident Number:**	CEN17IA233
Date & Time:	June 1, 2017, 18:30 Local	**Registration:**	N366TF
Aircraft:	SCHRODER DAVID LANCAIR IV P	**Aircraft Damage:**	None
Defining Event:	Loss of engine power (total)	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and a flight instructor planned to conduct an inflight calibration of an angle of attack indicator. Following a zero g-force maneuver, engine oil pressure decreased to 3 psi and engine speed increased to 3,140 rpm. Immediately after the engine overspeed, a total loss of power occurred. The pilot performed a forced landing to the departure airport without further incident.

Examination of the engine revealed one of the two rear crankshaft counterweights (6th order) separated from the crankshaft, with a 6th order counterweight connecting pin lodged in the crankcase between cylinder Nos. 4 and 6. An impression in the No. 1 connecting rod matched the shape of a 6th order counterweight connecting pin. The oil sump contained significant debris, including four counterweight pin retaining snap rings, four counterweight pin retainer plates, and two 6th order counterweight connecting pins. Based on the examination, the lack of oil pressure and subsequent engine rpm overspeed/surge likely caused the separation of the crankshaft counterweight and engine failure.

Probable Cause and Findings

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

The loss of oil pressure and subsequent engine overspeed/surge during a zero g-force maneuver, which resulted in the separation of a crankshaft counterweight and loss of engine power.

Findings

Aircraft	Recip engine power section - Failure
Aircraft	Oil - Related operating info

Factual Information

History of Flight

Maneuvering	Loss of engine power (total) (Defining event)

HISTORY OF FLIGHT

On June 1, 2017, at 1830 eastern daylight time, a Lancair IV-P airplane, N366TF, lost engine power and conducted a forced landing at the Oswego County Airport (FZY), Fulton, New York. The pilot and flight instructor were not injured and the airplane sustained minor damage. The airplane was registered to and operated by MS Rochelle LLC under the provisions of 14 *Code of Federal Regulations Part* 91 as a personal flight. Day visual meteorological conditions prevailed for the local flight, which departed from FZY at 1819

The purpose of the flight was to calibrate an Advanced Flight Systems Advanced Pro 3 angle of attack system, which included a series of zero g-force maneuvers. According to the flight instructor, during the first maneuver, he and the pilot noticed an engine overspeed, as well as a noticeable "bang" and a total loss of engine power. The pilot performed a forced landing at FZY without further incident. During the descent and landing, the propeller continued to windmill.

According to data downloaded from the onboard Electronics International MVP-50 engine monitor, engine start occurred at 1806. A normal engine runup occurred at 1816, including magneto and propeller governor checks. Takeoff with full engine power occurred at 1819 and the airplane climbed normally to 12,000 ft msl.

At 1829:29, the zero g-force maneuver occurred. Oil pressure indications, which had been normal until this time, decreased to 3 psi by 1829:32, followed by an engine overspeed of 3,140 rpm at 1829:34. From 1829:34 to 1830:10, engine rpm indications varied from zero to 2,700 rpm, and oil pressure indications varied from zero to 50 psi. At 18:29:38, the alternator charge indication dropped to zero.

AIRCRAFT INFORMATION

The composite airplane was constructed from a kit with components manufactured by Lancair International, Inc. The airplane was equipped with a Continental Motors TSIO-550E engine (s/n 803138), an MT Propeller USA MTV-14-D constant-speed four-blade wood propeller (non-counterweighted), and a McCauley C290D3-K/T43 propeller governor. According to the engine's type certificate data sheet, maximum engine rpm was 2,700 rpm. The oil sump capacity was 12 quarts, with 6.5 quarts usable at a 14.5 degrees nose down attitude.

According to engine logbooks, a teardown inspection occurred on December 18, 2008, due to a propeller strike. On October 15, 2012, Barrett Precision Engines Inc. overhauled the engine, which included documented compliance with Continental Motors Service Bulletin 00-3, Counterweight Installation. On February 1, 2017, an entry was recorded to correct a rough running engine and a rising No. 3 cylinder

exhaust gas temperature; which maintenance attributed to incorrect timing. On April 7, 2017, the No. 3 cylinder was replaced, due to a fractured bolt on the intake rocker shaft.

ENGINE EXAMINATION

Examination of the engine revealed the crankcase was breached in several places and the camshaft drive gear was displaced away from the crankshaft drive gear. Extensive internal damage was noted to the interior of the crankcase and cylinder skirts, due to connecting rod contact. Both magnetos were dislodged from their respective mounts. One of the two rear crankshaft counterweights (6th order) was separated from the crankshaft, and the Nos. 1 and 4 connecting rods were fractured.

The oil tube from the sump to the oil pump was compromised and thermal discoloration and oil starvation distress were noted on the Nos 2, 3, 4, and 6 connecting rods and bearings. The oil sump contained significant metal fragments, including four counterweight pin retaining snap rings, four counterweight pin retainer plates and two 6th order counterweight connecting pins. After separating the engine case, a 6th order counterweight connecting pin was found lodged in the crankcase between cylinders Nos. 4 and 6 and an impression in the No. 1 connecting rod matched the shape of a 6th order counterweight connecting pin.

ADDITIONAL INFORMATION

On November 15, 2015, a Lancair IV-P accident occurred that involved the same model engine, propeller, and propeller governor as this incident. The sequence of events for the accident (NTSB# CEN16LA043) involved a practice emergency descent with a 0.5 g-force load factor, which led to an engine oil pressure drop, engine overspeed, and total loss of power. The investigation concluded that a duel magneto failure occurred due to an engine overspeed/surge inducing shock loads on the gear train. During this investigation, several Lancair pilots who had competed in the Reno Air Races stated that low G maneuvering would often result in a transient drop in engine oil pressure and an engine surge and/or overspeed.

According to the Federal Aviation Administration (FAA) small airplane standards staff, an angle of attack system calibration procedure which requires zero g-force flight is not approved for installation on certified aircraft.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	36,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	April 29, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	May 10, 1997
Flight Time:	1204 hours (Total, all aircraft), 1 hours (Total, this make and model), 1140 hours (Pilot In Command, all aircraft), 12 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	SCHRODER DAVID	**Registration:**	N366TF
Model/Series:	LANCAIR IV P NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2000	**Amateur Built:**	Yes
Airworthiness Certificate:	Normal; Experimental (Special)	**Serial Number:**	LIV-388
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	November 16, 2016 Condition	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1146.57 Hrs at time of accident	**Engine Manufacturer:**	CONT MOTOR
ELT:		**Engine Model/Series:**	TSIO-550 SER
Registered Owner:	On file	**Rated Power:**	360 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KFZY,475 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	18:54 Local	**Direction from Accident Site:**	111°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	300°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.96 inches Hg	**Temperature/Dew Point:**	14°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	FULTON, NY (FZY)	**Type of Flight Plan Filed:**	None
Destination:	FULTON, NY (FZY)	**Type of Clearance:**	VFR
Departure Time:	18:15 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	OSWEGO COUNTY FZY	**Runway Surface Type:**	Asphalt
Airport Elevation:	475 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	33	**IFR Approach:**	None
Runway Length/Width:	5196 ft / 100 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	None
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	43.350833,-76.388053(est)

Administrative Information

Investigator In Charge (IIC):	Folkerts, Michael
Additional Participating Persons:	Jay Turnberg; Airworthiness Certification Office; Atlanta, GA Nicole Charnon; Continental Motors; Mobile, AL Jeff Edwards; Lancair Owners and Builders Organization; Saint Louis, MO
Original Publish Date:	November 6, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this incident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95383