Aviation Investigation Final Report

Location:	Holland, Michigan	**Accident Number:**	CEN16LA363
Date & Time:	September 3, 2016, 18:30 Local	**Registration:**	N4513S
Aircraft:	CGS AVIATION HAWK AERO II	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot stated that the experimental light sport airplane experienced a partial loss of engine power during climb after takeoff about 80 to100 ft above ground level. The airplane entered an aerodynamic stall, so the pilot decreased the pitch attitude to recover, but the airplane then impacted power lines.

Postaccident examination of the engine revealed numerous items that had not been performed in accordance with the engine manufacturer's maintenance instructions, one of which was the correct installation of a quick release connector in the fuel lines. When the quick release connector was tested, it leaked a substantial amount of air into the fuel system; therefore, it is likely that air entered the fuel system during the flight and resulted in the partial loss of engine power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The improper installation of quick release connectors in the fuel lines, which was not in accordance with the engine manufacturer's maintenance instructions and allowed air to be introduced into the fuel system and resulted in a partial loss of engine power. Also causal to the accident was the pilot's failure to maintain adequate airspeed and exceedance of the airplane's critical angle of attack, which resulted in an aerodynamic stall and impact with power lines.

Findings

Aircraft	Fuel distribution - Incorrect service/maintenance
Personnel issues	Installation - Maintenance personnel
Aircraft	Airspeed - Attain/maintain not possible
Aircraft	Angle of attack - Capability exceeded
Personnel issues	Aircraft control - Pilot
Environmental issues	Wire - Effect on operation

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Initial climb	Loss of engine power (partial)
Initial climb	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On September 3, 2016, at 1830 eastern daylight time, an experimental light sport CGS Aviation Hawk Aero II airplane, N4513S, collided with power line(s) and terrain during an en route climb following takeoff from Park Township Airport (HLM), Holland, Michigan. The airplane was destroyed. The pilot sustained serious injuries. The airplane was registered to and operated by the pilot under 14 Code of Federal Regulations Part 91 as a personal flight that was not operating on a flight plan. Day visual meteorological conditions prevailed at the time of the accident. The local flight was originating at the time of the accident.

A National Transportation Safety Board (NTSB) Pilot/Operator Accident/Incident Report (form 6120.1) was not received from the pilot.

The pilot, who was the airplane owner, stated in a telephone conversation with the NTSB Investigator-In-Charge, that the engine never stopped running and was not running at a high engine speed. During the climbout after takeoff, the engine started to sputter about 80-100 feet above ground level. The airplane "started stalling," so he pushed the nose down to increase airplane airspeed to recover from the aerodynamic stall. He said that if the airplane had not hit the power line(s), he would not have been involved in an accident.

Post-accident examination of the airplane and an engine run were performed at the pilot's hangar by a representative from the engine manufacturer and by the Federal Aviation Administration Coordinator for the accident. The engine was a Rotax 582 MOD 99, serial number 543 7309.

The examination revealed that all the spark plugs were NGK BR8ES that had removable resistor caps, which was not in accordance with the engine manufacturer's maintenance manual. The spark plug gaps were 0.29 - 0.30 inch (the engine maintenance manual specifies a gap size of 0.020 inch). All the spark plugs' electrodes exhibited a color consistent with a rich fuel mixture. The number 4-cylinder spark plug on the magneto side of the engine was loose and did not meet the torque specification in accordance with the engine manufacturer's maintenance manual.

The power takeoff and magneto sides of the engine had both carburetors equipped with larger main jets, which were 190 size jets instead of the engine manufacturer's original equipment, which were 165 size jets (higher jet numbers equate to a richer mixtures). Both carburetor chokes were blocked off and removed from service. Both jet needles clip positions were in the number 4 position and not in the number 3 position, as specified in the engine manufacturer's maintenance manual.

There were no fuel filters installed between the fuel pumps and carburetors as specified in the engine manufacturer's maintenance manual. The pneumatic fuel pump was found installed on the engine with the small drain hole near the impulse connection, positioned horizontally. The engine manufacturer's maintenance manual states that "The fuel pump should be installed in a cool place (not on the engine itself), with the small drain hole near the impulse connection towards the bottom. This hole drains oil condensate from the pump diaphragm chamber".

The gascolator was installed with industrial style (non-airplane) brass plumbing fittings and an industrial style (non-airplane) shut-off valve. Plumbers thread seal tape was present on the threads of the fuel line fittings. There was no fire sleeve on any of the fuel lines.

The fuel header tank was a white plastic container that was consistent with a water jug. The threaded cap of the header tank had a fuel system quick release type connector attached with a pick-up tube that extended to the bottom of the container. When the quick release type connector was tested, it leaked a substantial amount of air into the fuel system.

The engine manufacturer's maintenance manual stated: "Quick release type connectors can cause air leaks and produce fuel flow restrictions and possible blockage sites" "the tiniest flaw in any joint will cause air to be sucked into the fuel system, considerably reducing the capacity of the fuel pump. Air leaks are much more dangerous when the fuel tank is mounted below the fuel pump and carburetors"

The engine was run for several minutes with multiple throttle inputs during which no anomalies in engine power occurred.

Following the accident, the engine manufacturer issued a publication, "Two-Stroke Safety Issues", which in part discussed fuel system air leaks and the use of quick release connectors in the fuel system.

Pilot Information

Certificate:	Private	**Age:**	60,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	August 8, 2011
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	216 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CGS AVIATION	**Registration:**	N4513S
Model/Series:	HAWK AERO II	**Aircraft Category:**	Airplane
Year of Manufacture:	2001	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental light sport (Special)	**Serial Number:**	H II 159-A-582-TRI
Landing Gear Type:		**Seats:**	2
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	550 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Rotax
ELT:		**Engine Model/Series:**	582
Registered Owner:		**Rated Power:**	65 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	AZO,874 ft msl	**Distance from Accident Site:**	43 Nautical Miles
Observation Time:	17:53 Local	**Direction from Accident Site:**	141°
Lowest Cloud Condition:	Few / 4700 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.18 inches Hg	**Temperature/Dew Point:**	25°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Holland, MI (HLM)	**Type of Flight Plan Filed:**	None
Destination:	Holland, MI (HLM)	**Type of Clearance:**	None
Departure Time:	18:30 Local	**Type of Airspace:**	

Airport Information

Airport:	Park Township Airport HLM	**Runway Surface Type:**	Asphalt
Airport Elevation:	603 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	23	**IFR Approach:**	None
Runway Length/Width:	2999 ft / 50 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	42.796665,-86.161666(est)

Administrative Information

Investigator In Charge (IIC):	Gallo, Mitchell
Additional Participating Persons:	Ramon Grillo; Federal Aviation Administration; GRR FSDO; Grand Rapids, MI
Original Publish Date:	August 15, 2018
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93978