Aviation Investigation Final Report

Location:	White City, Oregon	**Accident Number:**	WPR13LA363
Date & Time:	July 13, 2013, 16:30 Local	**Registration:**	N399Q
Aircraft:	QUARNOCCIO AVID FLYER	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that he departed in the experimental amateur-built airplane and that, during climbout, he noticed that the engine coolant temperature was above normal and continuing to rise, so he initiated a turnback toward the airport. The pilot retarded the throttle slightly and leveled off, but the temperature continued to rise. The airplane crossed the runway midfield and then entered the downwind leg. The engine rpm dropped, and the engine began running roughly and then quit as the pilot began turning the airplane onto the base leg. The pilot recognized that he would be unable to reach the runway, so he selected a field short of the threshold for a forced landing. The pilot intentionally stalled the airplane a few feet above the ground to touch down sooner because he wouldn't be able to clear a fence ahead. The airplane landed hard, and the main landing gear bungees failed. The airplane then struck the fence. The investigation could not determine why the engine coolant operating temperature reported by the pilot exceeded the engine manufacturer's maximum operating temperature or the accuracy of the installed engine temperature indication system. However, the timing of the pilot's observation of unusual coolant temperature and the subsequent loss of engine power support an engine overtemperature-related problem; postaccident engine examination was unable to determine the reason for the coolant overtemperature.

Probable Cause and Findings

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

Excessive engine operating temperature, which resulted in engine failure and a forced landing. The reason for the excessive engine operating temperature could not be determined during postaccident engine examination.

Findings

Not determined	(general) - Unknown/Not determined
Aircraft	Recip eng liquid cooling - Malfunction

Factual Information

History of Flight

Enroute-climb to cruise	Powerplant sys/comp malf/fail
Enroute-climb to cruise	Loss of engine power (total) (Defining event)
Enroute-climb to cruise	Off-field or emergency landing

On July 13, 2013, about 1630 Pacific daylight time, an experimental amateur-built Avid Flyer light sport airplane, N399Q, was substantially damaged during an off-airport forced landing following a complete loss of engine power near Beagle Skyranch airport (OR96), White City, Oregon. The private pilot/owner was not injured. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the flight.

According to the pilot, the preflight inspection, engine start, taxi-out, run-up, takeoff and initial climbout were all normal. The departure was conducted to the south from the unpaved runway at the non-towered airport. After takeoff, the pilot turned the airplane to the left (east) and continued climbing. He then noticed that the engine coolant temperature was rising faster than expected, and initiated a turnback to the airport. At an altitude of about 750 feet above the ground, he noticed the coolant temperature was still rising, so he reduced the power, and crossed over the airport in preparation for entering a left downwind leg to land back on the runway to the north (since hills precluded landing to the south). When the airplane was abeam of the pilot's target landing location on the runway, the engine rpm decreased from 6,000 to about 3,500 rpm, and then the engine ceased operating. The pilot recognized that he would be unable to reach the runway, and selected a field as his new landing site. When the airplane was on short final, the pilot recognized that the airplane would not clear a double row of steel post fences that bordered the field perpendicular to the final approach path. The pilot "stalled" the airplane to get it on the ground quickly, and "skidded" into the fence.

Subsequent to the accident, the airplane was recovered by the pilot and some acquaintances, who placed it on a trailer and returned it to the pilot's home airport.

Pilot Information

Certificate:	Private	**Age:**	63
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
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:**	December 17, 2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	146 hours (Total, all aircraft), 23 hours (Total, this make and model)		

According to the pilot, he held a private pilot certificate, with an airplane single-engine land rating. He reported that he had a total flight experience of about 146 hours, with approximately 23 hours in the accident airplane make and model.

His most recent flight review was completed in August 2012, and his most recent Federal Aviation Administration (FAA) third-class medical certificate was issued in December 2012.

Aircraft and Owner/Operator Information

Aircraft Make:	QUARNOCCIO	**Registration:**	N399Q
Model/Series:	AVID FLYER	**Aircraft Category:**	Airplane
Year of Manufacture:	1990	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	399
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	March 6, 2013 Annual	**Certified Max Gross Wt.:**	941 lbs
Time Since Last Inspection:	1 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	578.4 Hrs as of last inspection	**Engine Manufacturer:**	Rotax
ELT:	C91 installed, not activated	**Engine Model/Series:**	582
Registered Owner:	On file	**Rated Power:**	64 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was manufactured in July 1990. It was equipped with a Rotax 582 series engine. The accident pilot purchased the airplane in the fall of 2009, and thereby became its fourth owner.

The cooling system was a pressurized liquid (water and antifreeze) type, with an integrated water pump and a radiator. According to the Rotax engine installation manual, coolant flow rate should be between 60 and 70 liters per minute, and the coolant in the system must be "under pressure" in order to prevent pump cavitation. System pressurization was to be accomplished by means of a pressure cap with a

release pressure of approximately 0.9 bar (13 psi). The system included an overflow bottle, and the installation manual specified monitoring of this bottle as a means of ensuring correct cooling system pressurization and operation. The manual stated that the average coolant operating temperature should be between 60 and 80 degrees C (140 to 175 degrees F), and that the maximum allowable coolant operating temperature was 80 degrees C.

Maintenance records indicated that the most recent annual condition inspection was completed on March 6, 2013. At that time the hour meter indicated 578.4 hours, and the engine had a total time in service of 126.3 hours. The hour meter indicated 581.8 hours after the accident.

Separate post impact examinations of the airplane by the pilot and an FAA inspector did not reveal any reasons for the elevated coolant temperature and the engine failure.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MFR	**Distance from Accident Site:**	9 Nautical Miles
Observation Time:	16:53 Local	**Direction from Accident Site:**	180°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.9 inches Hg	**Temperature/Dew Point:**	32°C / 7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	White City, OR (OR96)	**Type of Flight Plan Filed:**	Unknown
Destination:	White City, OR (OR96)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

The 1653 automated weather observation at Rogue Valley International airport (MFR), Medford, located about 9 miles south of the accident site, included winds from 290 degrees at 10 knots, visibility 10 miles, clear skies, temperature 32 degrees C, dew point 7 degrees C, and an altimeter setting of 29.91 inches of mercury.

Airport Information

Airport:	Beagle Skyranch OR96	**Runway Surface Type:**	Grass/turf
Airport Elevation:	1436 ft msl	**Runway Surface Condition:**	Rough;Vegetation
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing;Traffic pattern

According to FAA information, OR96 was a private airstrip, equipped with a single turf runway designated 15/33. The runway measured 3,000 feet by 130 feet, and the airport elevation was listed as 1,436 feet above mean sea level.

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	42.559982,-122.920684(est)

The airplane came to rest upright. The airplane sustained damage due to the pilot's intentional stall and the airplane's impact with the steel pole fence that extended perpendicular to the flight path. Damaged components included the landing gear, propeller, engine cowling, right wing struts, and left wing tip.

In his post accident written statement to the NTSB, the pilot reported that the "normal" coolant temperature during climb was 195 degrees F. That value is 20 degrees F above the maximum allowable coolant temperature specified in the engine manufacturer's installation manual. The investigation did not verify that the engine cooling system was equipped in accordance with the engine manufacturer's installation manual, and did not verify the integrity or functionality of the entire cooling system. The accuracy of the installed engine coolant temperature indicating system was not determined. The reason for the differences between the pilot's reported normal coolant temperature of 195 degrees F, and the maximum allowable coolant temperature specified by the installation manual (175 degrees F), was not determined.

Administrative Information

Investigator In Charge (IIC):	Huhn, Michael
Additional Participating Persons:	Ian Hansen; FAA FSDO; Portland, OR
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