



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	FORT PIERCE, Florida	Accident Number:	MIA99LA184
Date & Time:	June 15, 1999, 10:04 Local	Registration:	N19DW
Aircraft:	DONALD WHITE VELOCITY XL/RG	Aircraft Damage:	Substantial
Defining Event:		Injuries:	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

While maneuvering in cruise flight, the pilot/builder of the experimental airplane noticed a fluctuating fuel pressure gage and then the engine quit. The pilot executed a forced landing onto an interstate highway. Postcrash examination revealed an empty right wing fuel tank and no other abnormality of the fuel system and engine. Postcrash start and operation of the engine was satisfactory. The pilot/builder revealed that ever since he changed fuel filler caps, two flights before the accident flight, he had experienced fuel tank imbalance problems. A factory test pilot, using wing tank caps of various tightness adjustments, revealed that gravity feed from wing tank to sump tank could be interrupted if the cap were allowed to fit loosely and allow siphoning due to upper wing surface low pressure while in flight. As a result of the testing, the factory has increased the size of the fuel vent plumbing, eliminated the sump tank vent in favor of an air bleed, 'burp valve', and sent out alerts to all kit owners about fuel starvation resulting from loose-fitting caps.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The owner/pilot mechanic's failure to adjust the newly installed wing fuel caps resulting in the loss of engine power while in cruise flight due to fuel starvation and the subsequent collision with transmission wires while attempting a forced landing to a highway. Factors in the accident were the failure of the vent system to adequately compensate for the pressure differential created and the failure of the pilot to monitor fuel balance.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL

Phase of Operation: CRUISE

Findings

1. (F) FUEL SYSTEM, VENT - INADEQUATE
2. (C) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - ATTEMPTED - PILOT IN COMMAND
3. FLUID, FUEL - STARVATION

Occurrence #2: FORCED LANDING

Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT

Phase of Operation: EMERGENCY LANDING

Findings

4. (F) OBJECT - WIRE, TRANSMISSION

Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

On June 15, 1999, about 1004 eastern daylight time, a White Velocity XL/RG, N19DW, registered to a private individual, operating as a Title 14 Part 91 personal flight, crashed landed on an interstate highway following a loss of engine power while attempting a forced landing at the St. Lucie County International Airport, Fort Pierce, Florida. Visual meteorological conditions prevailed and no flight plan was filed. The aircraft sustained substantial damage and the private-rated pilot, the sole occupant, was not injured. The flight originated from Hollywood, Florida, about 34 minutes before the accident.

According to the pilot/builder, he was in cruise flight at 1,500 feet msl, about 10 miles southwest of the St. Lucie County Airport. He was maneuvering to attain a visual on his destination, a private airstrip. Without warning, he experienced a rapid decrease of engine power that activation of the electric fuel boost pump appeared to remedy. One or 2 minutes later, the engine again lost power and he noticed the fuel pressure gage indicating zero. He turned toward St. Lucie County Airport, but when it became obvious to him that engine power available would not sustain flight to the airport, he chose the highway for a forced landing. The aircraft collided with pole-mounted power transmission lines on approach to the highway about 4 miles west of the St. Lucie County Airport, that caused a hard touchdown to the pavement. He estimated that his fuel distribution at the beginning of the flight to be 5 to 10 gallons in the right tank, 10 to 12 gallons in the left tank, and 3 gallons in the sump tank. He further stated that he had recently replaced the factory-provided wing tank fuel caps with a different set of caps about a week before the accident. The new caps were not vented, and in retrospect, he stated the caps did not feel as tightly sealed to the filler pipe flange as the previous ones, but thought no more of it. He added that he began to have fuel balance problems that he had not experienced before, but did not make the connection.

According to St. Lucie County FAA Control Tower personnel, at 1002 the pilot radioed that he was a possible emergency due to low fuel pressure and shortly thereafter, advised that he could not make the field due to low power and was landing on I-95.

Subsequent examination of the wreckage and interview of the pilot/builder by FAA personnel revealed that the aircraft is configured with a 33-gallon fuel tank in each wing that gravity feeds into a fuselage mounted 3-gallon sump tank and thence to the aft-mounted engine via an electric driven boost pump. There is no fuel selector valve on the aircraft. The fuel quantity indication system consisted of graduations on a left and right sight-gage made of clear flex-tubing spliced inline with fuel feed lines between the wing tanks and the sump tank and routed into the cabin. Eight to nine gallons of uncontaminated 100LL aviation fuel was contained in the left wing/sump tank combination and no fuel was found in the right tank, postcrash. The wreckage was subsequently moved to county property where operational testing of the fuel system and engine was conducted. The engine started with no problems

and exhaust sound was relatively smooth and consistent. High end rpm was not tested due to propeller damage and imbalance.

The new fuel tank caps are shipped from the kit factory with adjustment instructions attached, but the pilot does not remember seeing them, (a copy of the instructions is included in this report). All three tanks are vented to the outside atmosphere, but inspection of the total vent system revealed some plumbing component's inside diameter measurements to be as small as .18 inch. Pressurizing either wing tank with air revealed that the fuel vent system could not adequately equalize the pressure, and air bypass at the loosest fitting fuel cap occurred. It is reasoned that the opposite would also take effect, i.e. a negative pressure as occurs above the wing during flight would also cause air bypass, (siphoning of air) out of the wing tank through the loose fitting cap. The net effect would be a low pressure or vacuum created in the wing fuel tank that would interfere with gravity feed into the sump tank and eventual fuel starvation. The factory provides, as an option to the basic airplane kit at additional cost, a "low fuel" warning light for the sump tank, but this airplane was not so equipped.

As a result of this occurrence, flight testing was performed at the Velocity Aircraft Factory, Sebastian, Florida, using loose-fitting fuel tank caps in an attempt to duplicate the conditions present during the accident. It was revealed that the wing tanks did, in fact, stop their gravity feed and the sump tank quantity started decreasing when using the loose cap. As a result of the testing, the factory is experimenting with replacing the 1/4 inch fuel vent tubing with 3/8 inch tubing in the wing tanks. Additionally, the factory eliminated the sump fuel vent in favor of an air bleed-off valve or "burp" valve for use during pilot's preflight walk-around inspection. The factory has also issued an alert via newsletter to all kit owners concerning the hazards of using loose-fitting wing tank fuel caps. Applicable excerpts from that newsletter are included in this report.

Pilot Information

Certificate:	Private	Age:	59, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
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 Valid Medical--w/ waivers/lim	Last FAA Medical Exam:	December 8, 1997
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	823 hours (Total, all aircraft), 117 hours (Total, this make and model), 777 hours (Pilot In Command, all aircraft), 35 hours (Last 90 days, all aircraft), 14 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	DONALD WHITE	Registration:	N19DW
Model/Series:	VELOCITY XL/RG VELOCITY X	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	3RX026
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	August 8, 1999 Annual	Certified Max Gross Wt.:	2750 lbs
Time Since Last Inspection:	117 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	117 Hrs	Engine Manufacturer:	Lycoming
ELT:	Installed, activated, did not aid in locating accident	Engine Model/Series:	IO-540-E4C5
Registered Owner:	DONALD WHITE	Rated Power:	260 Horsepower
Operator:		Operating Certificate(s) Held:	None
Operator Does Business As:		Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	FPR ,25 ft msl	Distance from Accident Site:	4 Nautical Miles
Observation Time:	10:04 Local	Direction from Accident Site:	80°
Lowest Cloud Condition:	Scattered / 2300 ft AGL	Visibility	10 miles
Lowest Ceiling:	Broken / 20000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	3 knots / None	Turbulence Type Forecast/Actual:	/
Wind Direction:	190°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	30°C / 24°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	HOLLYWOOD (HWO)	Type of Flight Plan Filed:	None
Destination:	FORT PIERCE	Type of Clearance:	None
Departure Time:	09:30 Local	Type of Airspace:	Class E

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:	0	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Forced landing

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:	27.44083,-80.560295(est)

Administrative Information

Investigator In Charge (IIC): Stone, Alan

Additional Participating Persons: SCOTT STRICKLAND; ORLANDO , FL

Original Publish Date: March 2, 2001

Last Revision Date:

Investigation Class: [Class](#)

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=46589>

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).