



# Aviation Investigation Final Report

<b>Location:</b>	Milton, Florida	<b>Accident Number:</b>	ERA23LA124
<b>Date &amp; Time:</b>	February 6, 2023, 14:32 Local	<b>Registration:</b>	N330PC
<b>Aircraft:</b>	CANTON PAUL A RV-6	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Fuel starvation	<b>Injuries:</b>	1 Serious
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

After having a condition inspection of the experimental amateur-built airplane completed, the pilot reported performing a thorough preflight inspection, checking both fuel tanks for contamination with none noted. The left wing fuel tank contained about 7 gallons of 100LL aviation fuel and the right wing fuel tank was almost full. The preflight inspection, engine start, and run-up were normal. During initial climb, the engine sustained a total loss of power. The pilot pushed the nose over and attempted a left turn to return to the airport. The engine regained power shortly before the airplane impacted the ground and a fuel truck, resulting in substantial damage.

Postaccident examination of the engine found no evidence of a preimpact mechanical malfunction or failure that would have precluded normal operation. Examination of the wing fuel tanks revealed that the fuel pickups in both wing fuel tanks were installed incorrectly as compared to the kit manufacturer's plans; both lines were facing forward instead of aft. The incorrect positioning of the pickup lines made it likely that the amount of unusable fuel was greatly increased, especially at nose high pitch attitudes, such as during takeoff and initial climb, due to the fuel's movement toward the aft portion of the tank. The pilot reported that he was not provided documentation when he bought the airplane as to the quantity of unusable fuel, nor had the unusable fuel amounts been calculated since he purchased the airplane.

A review of maintenance records showed that the kit manufacturer's service bulletin and a service notification letter relating to fuel pickups had not been complied with. While compliance was not mandatory, if the service bulletin and service letter had been complied with, it is possible that the incorrect fuel pickup orientation would have been identified.

Although the amount of unusable fuel in the selected tank selected could not be determined (given the damage sustained to the tank during the accident), it is likely that during initial climb the engine was starved for fuel due to the incorrect installation of the pickup lines, resulting in a loss of engine power.

## Probable Cause and Findings

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

The incorrect installation of the fuel pickups, which resulted in a total loss of engine power due to fuel starvation. Contributing was the lack of documentation of the airplane’s unusable fuel.

Findings	
Personnel issues	Installation - Owner/builder
Aircraft	Fuel distribution - Incorrect service/maintenance
Personnel issues	Transfer of knowledge - Owner/builder
Personnel issues	Knowledge of equipment - Pilot

# Factual Information

## History of Flight

Initial climb	Fuel starvation (Defining event)
Post-impact	Collision with terr/obj (non-CFIT)

On February 6, 2023, at 1432 central standard time, an experimental amateur-built RV-6, N330PC, was substantially damaged when it was involved in an accident near Milton, Florida. The airline transport pilot was seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to the pilot, he was relocating the airplane following completion of its annual condition inspection. He reported performing a thorough preflight inspection that included sampling the fuel, with no contaminants noted, checking the oil, which was full at 8 quarts, and checking the tires and brakes, which were new. He also reported that the left fuel tank was indicating about 7 gallons of fuel and the right fuel tank was almost full. Nothing abnormal was observed during the preflight, engine start, or run-up and taxi. The pilot reported he positioned the fuel selector to the right fuel tank before taxiing to the runway. Shortly after takeoff, during the initial climb about 300 to 400 ft mean sea level, the engine “let out a muffled, sucking backfire” and sustained a total loss of power that was confirmed by multiple eyewitnesses. The pilot pushed the nose over abruptly to maintain airspeed and made a mayday radio call reporting the loss of engine power over the airport’s common traffic advisory frequency. During descent, the engine regained power shortly before the airplane impacted the ground. A witness was taking a video recording of the airplane during the flight and the video cofirmed the increase in engine power several seconds before impact.

The airplane impacted the ground and a fuel truck before coming to rest. There was no postimpact fire. Postaccident examination confirmed the fuselage, tail section, and wings were substantially damaged. The right wing was mostly intact and the left wing was crushed from impact with the ground and fuel truck. The right fuel tank remained intact and contained about 9 gallons of fluid consistent in color and odor with 100LL aviation fuel and no contaminants were noted. The left fuel tank was breached but contained residual fuel.

Postaccident examination of the engine yielded no anomalous damage or pre-impact failures or irregularities in the engine or its subcomponents.

Photographs showed the fuel pickups in the wings remained secured in place and the left fuel pickup exhibited impact damage. The fuel selector was in the left position and liquid with an odor consistent with 100LL aviation fuel was observed in the engine-driven fuel pump, fuel servo, the hose from the servo to the flow divider and in the flow divider. The fuel strainer

screen was removed and exhibited minimal debris. Both the electric fuel boost pump and engine-driven fuel pump were examined and operated normally with no anomalies noted. The fuel injector servo remained attached to the engine and examination revealed no damage or anomalies. The servo fuel regulator section was partially disassembled and no damage to the rubber diaphragms or other internal components was observed, and the injectors were free of any obstructions. The throttle control cable remained attached to the throttle control arm, which remained attached to the servo. The mixture control cable remained attached to the servo mixture control arm. The mixture control cable was impact separated at the rod end and the rod end remained attached to the servo.

The propeller and flange were impact separated from the engine and exhibited signatures consistent with torsional overload. One propeller blade was rotated about 90° in the hub such that the leading edge faced forward and was curled aft beginning about 1 ft from the tip and also exhibited trailing edge "S" bending, spanwise twisting, chord-wise abrasion, and leading-edge gouges. The opposing propeller blade was curled aft beginning about 8 inches from the tip and exhibited spanwise twisting, chord-wise abrasion, and leading-edge gouges. The propeller governor remained attached to the engine and no damage was noted. The governor drive assembly was rotated freely by hand. The governor oil screen was absent of debris.

The fuel pickup in both wing tanks were not installed correctly when compared to the plans for a Van's Aircraft RV-6. The plans called for the fuel pickups to be routed down towards the bottom of the fuel tank and then bend toward the aft bulkhead of the fuel tank, under the fuel sending unit. The fuel pickups on the accident airplane were routed down and then bent forward toward the leading edge (see figure 1). The kit manufacturer reported that if the fuel pickups were bent forward toward the leading edge instead of aft, as the plans called for, then the amount of unusable fuel would greatly increase. The pilot (who was the third owner of the airplane and not the original builder) reported that there was no documentation stating the amount of unusable fuel, only that the fuel tanks had a total capacity of 38 gallons. The investigation was not able to determine the amount of unusable fuel due to the selected fuel tank being compromised in the accident sequence. A "Flying Lessons" article published by the FAA on May 26, 2011, discussed how fuel moving away from the fuel tank pickups could result in fuel starvation and a loss of engine power.

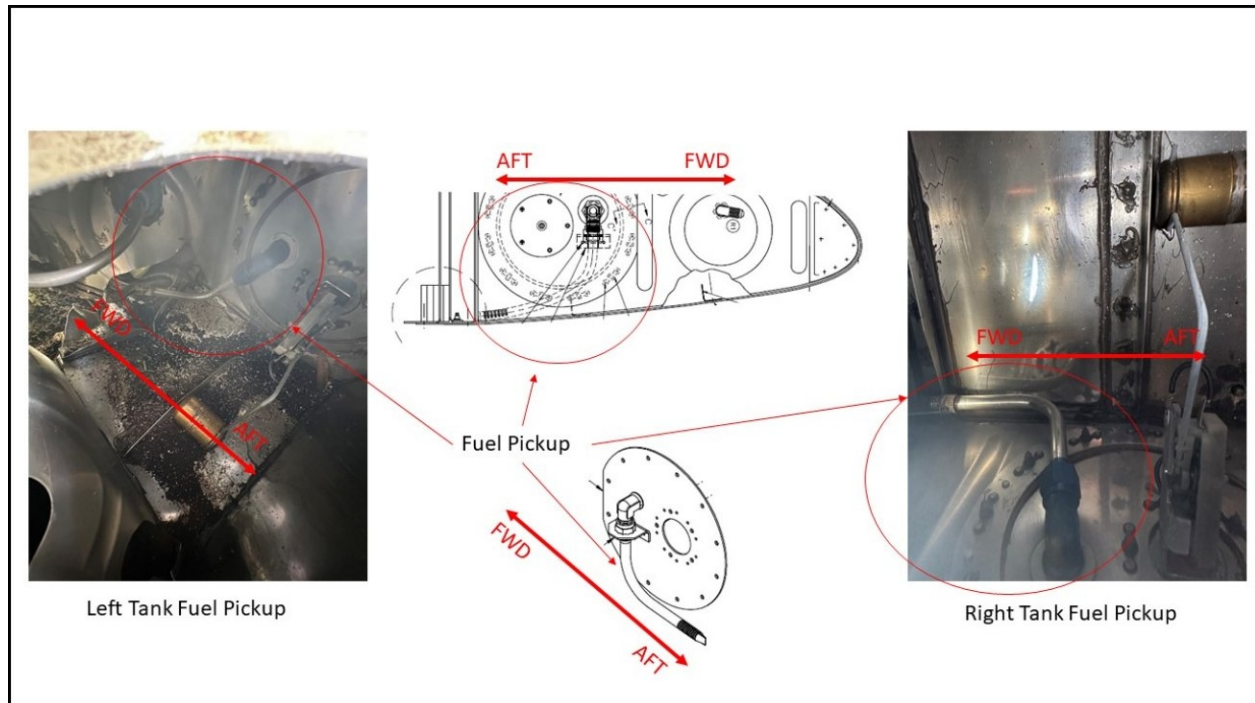


Figure 1 - Fuel pickup position on accident airplane with RV-6 plan schematic showing the proper configuration.

A review of maintenance records showed that service bulletin SB 06-2-23 and a service notification letter issued June 12, 2000, from the kit manufacturer, relating to the fuel pickups, had not been complied with. The publication *Service Bulletins and the Aircraft Owner*, published by the FAA, states, "Manufacturers issue aircraft Service Bulletins to inform owners and operators about critical and useful information on aircraft safety, maintenance, or product improvement," and, "If you are operating your aircraft under 14 CFR part 91, a service bulletin is advisory, and compliance is not mandatory unless it is included in an Airworthiness Directive." A search of the FAA Dynamic Regulatory System found no airworthiness directives for the Van's Aircraft Inc. RV-6.

## Pilot Information

<b>Certificate:</b>	Airline transport; Flight engineer; Flight instructor	<b>Age:</b>	64,Male
<b>Airplane Rating(s):</b>	Single-engine land; Single-engine sea; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Airplane; Helicopter	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	February 3, 2023
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	May 4, 2021
<b>Flight Time:</b>	11225 hours (Total, all aircraft), 400 hours (Total, this make and model), 5194 hours (Pilot In Command, all aircraft), 41 hours (Last 90 days, all aircraft), 4 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	CANTON PAUL A	<b>Registration:</b>	N330PC
<b>Model/Series:</b>	RV-6	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1998	<b>Amateur Built:</b>	Yes
<b>Airworthiness Certificate:</b>	Experimental (Special)	<b>Serial Number:</b>	23330
<b>Landing Gear Type:</b>	Tailwheel	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	January 25, 2023 Condition	<b>Certified Max Gross Wt.:</b>	1600 lbs
<b>Time Since Last Inspection:</b>	0 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	723.5 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	Installed	<b>Engine Model/Series:</b>	IO-360-B1B
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	180 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	NSE,199 ft msl	<b>Distance from Accident Site:</b>	5 Nautical Miles
<b>Observation Time:</b>	13:56 Local	<b>Direction from Accident Site:</b>	345°
<b>Lowest Cloud Condition:</b>	Few / 1000 ft AGL	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>		<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	4 knots /	<b>Turbulence Type Forecast/Actual:</b>	None / None
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	N/A / N/A
<b>Altimeter Setting:</b>	30.15 inches Hg	<b>Temperature/Dew Point:</b>	22°C / 7°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Milton, FL	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Baker, FL (18FD)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>		<b>Type of Airspace:</b>	Class G

## Airport Information

<b>Airport:</b>	PETER PRINCE FLD 2R4	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	81 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	18	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	3701 ft / 75 ft	<b>VFR Approach/Landing:</b>	Forced landing

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Serious	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Serious	<b>Latitude, Longitude:</b>	30.638474,-86.991712(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Young, Joshua
<b>Additional Participating Persons:</b>	Nina McBride; FAA/FSDO; Birmingham, AL J. Mike Childers; Lycoming Engines; Williamsport, PA Les Doud; Hartzell Propeller ; Piqua , OH
<b>Original Publish Date:</b>	May 2, 2024
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=106687">https://data.nts.gov/Docket?ProjectID=106687</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

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](#).