

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR24FA056

INVESTIGATIVE SUPPLEMENTAL MATERIAL

ACCIDENT

Location: Corona, CA
Date: 12.16.2023
Time: 1151 Pacific standard time
Airplane: Vans RV-8

INVESTIGATIVE SUPPLEMENTAL MATERIAL

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HISTORY OF FLIGHT

On December 16, 2023 at 1151 Pacific standard time, a Vans RV-8, N6948L, was substantially damaged when it was involved in an accident near Corona, California. The pilot and passenger were fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

The pilot had flown the airplane to Corona on November 13, 2023 for the purpose of having it painted there. The accident flight was the first flight after it was painted. The paint shop required the pilot to disassemble and reassemble the airplane before and after the painting because it was a homebuilt airplane. The pilot had the left fuel tank empty because he drained and repaired it prior to flying the airplane to Corona. The pilot did not refuel the airplane after it was painted. Witnesses reported hearing the airplane during the takeoff and remarked that the engine sounded as if it was “missing” and producing partial power.

A review of the recorded security camera footage at the airport revealed that the airplane came into the frame at 1149:23 when it was midway down runway 07 (passing by the fuel tanks) with all the landing gear on the surface. The airplane continued down the runway and rotated about 4 seconds later. Based on the distance and time, the airplane’s speed was calculated to be 71 kts at the time of rotation and a sound spectrum analysis revealed that the engine rpm was about 2,500 at that time. The airplane climbed slightly, just passing over a berm at the airport’s perimeter reaching a maximum altitude of about 95 ft above the runway. The estimated ground speed was 58 kts. Thereafter, the airplane descended and made a left turn, disappearing from the frame.



Figure 1: Flight Path



Figure 2: Video Composite of Security Camera

WRECKAGE AND IMPACT

The accident site was located in soft dirt about 3,650 ft from the departure end of runway 25. In character, the terrain was located in a water-runoff and populated with large bush, trees, tumbleweeds, and discarded trash. The main wreckage, consisting of the engine and remains of the fuselage, came to rest upright under a tree and had burned the terrain in the surrounding 5 to 10 ft.



Figure 3: Airport Location in Reference to Accident Location

There was ongoing construction and an open dirt field immediately after the berm at the end of the runway between the airport and the accident site.



Figure 4: Terrain Between Airport and Accident Site

The wreckage was consumed by post-impact fire and a majority of the fuselage, wings and skin panels were charred, puddled aluminum and ash. The airplane was on a magnetic bearing of about 055 degrees. The entire airplane was located at the accident site with the exception of portions of the wheel pants and outboard left wing, which was all found in the debris path.



Figure 5: Main Wreckage

The first identified points of contact consisted of disrupted concrete and markings on the west side of the flat paved road, making up the far west-end of the debris field. The initial impact was located between two powerline poles spaced 275 ft apart with numerous powerlines strung between them at 30 ft above the ground.

The first impact was a groove in the edge of the concrete wall making the lip of the road, consistent with contact from the left-wing tip. There were paint transfers and a small pile of paint chips adjacent to the divot. Small pieces of grey and white paint chips were scattered in the area as well as large portions of curved plexiglass that was similar in convex and had hardware pattern to that of the wingtip-light housing.

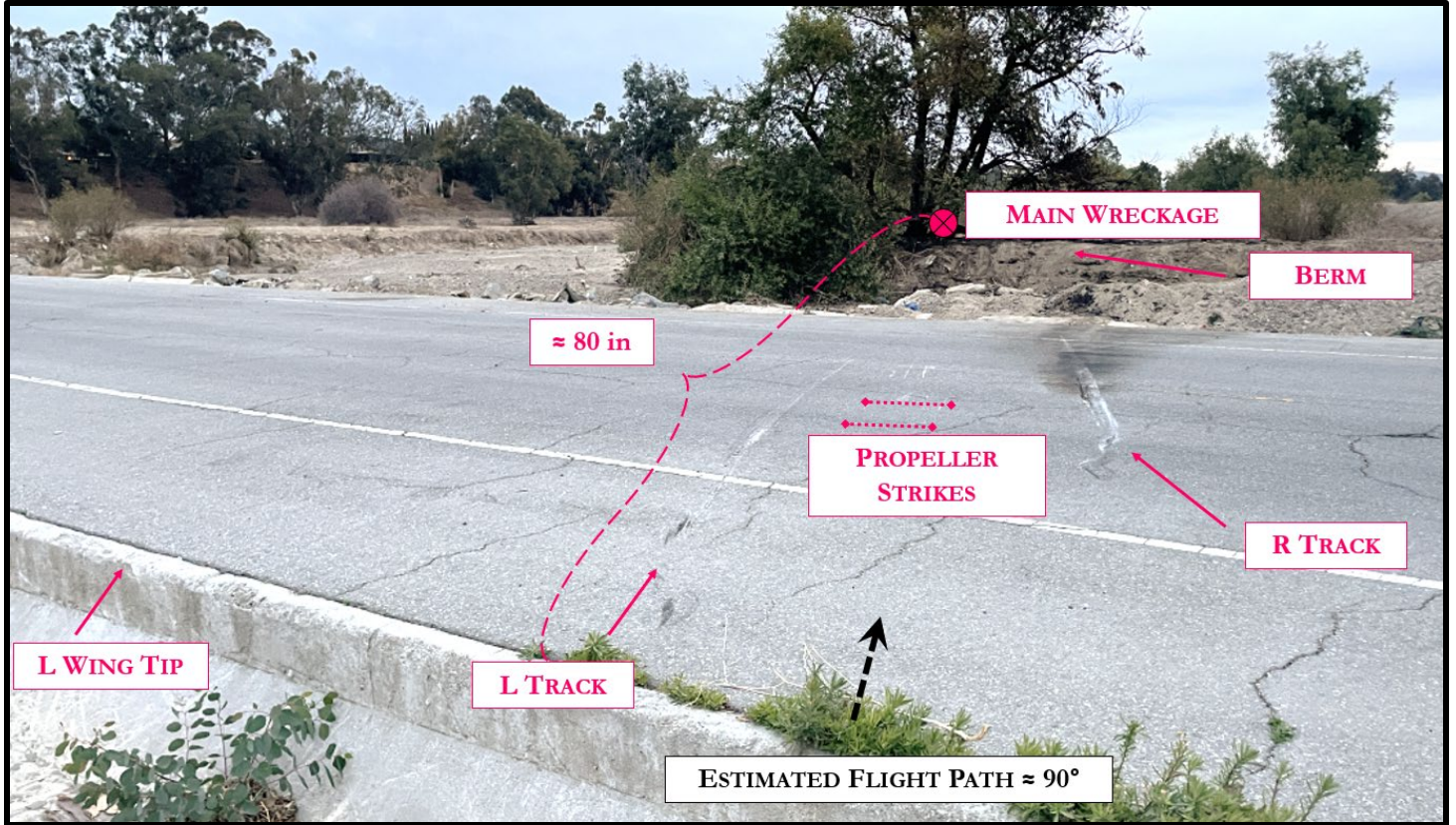


Figure 6: Debris Field

From that initial left-wingtip divot, located about 85 inches south, there was a black smudge transfer on the road's surface. As the debris field continued toward the main wreckage, that smudge track continued forward and became a white paint transfer line. About 4 ft along that white paint transfer line was a deep groove in the concrete that continued in the direction of the wreckage. The right track started 8 ft east of the beginning of the left track and paralleled that track with white transfer marks that became a deep groove in pavement.



Figure 7: Accident Site in Reference to the Powerlines

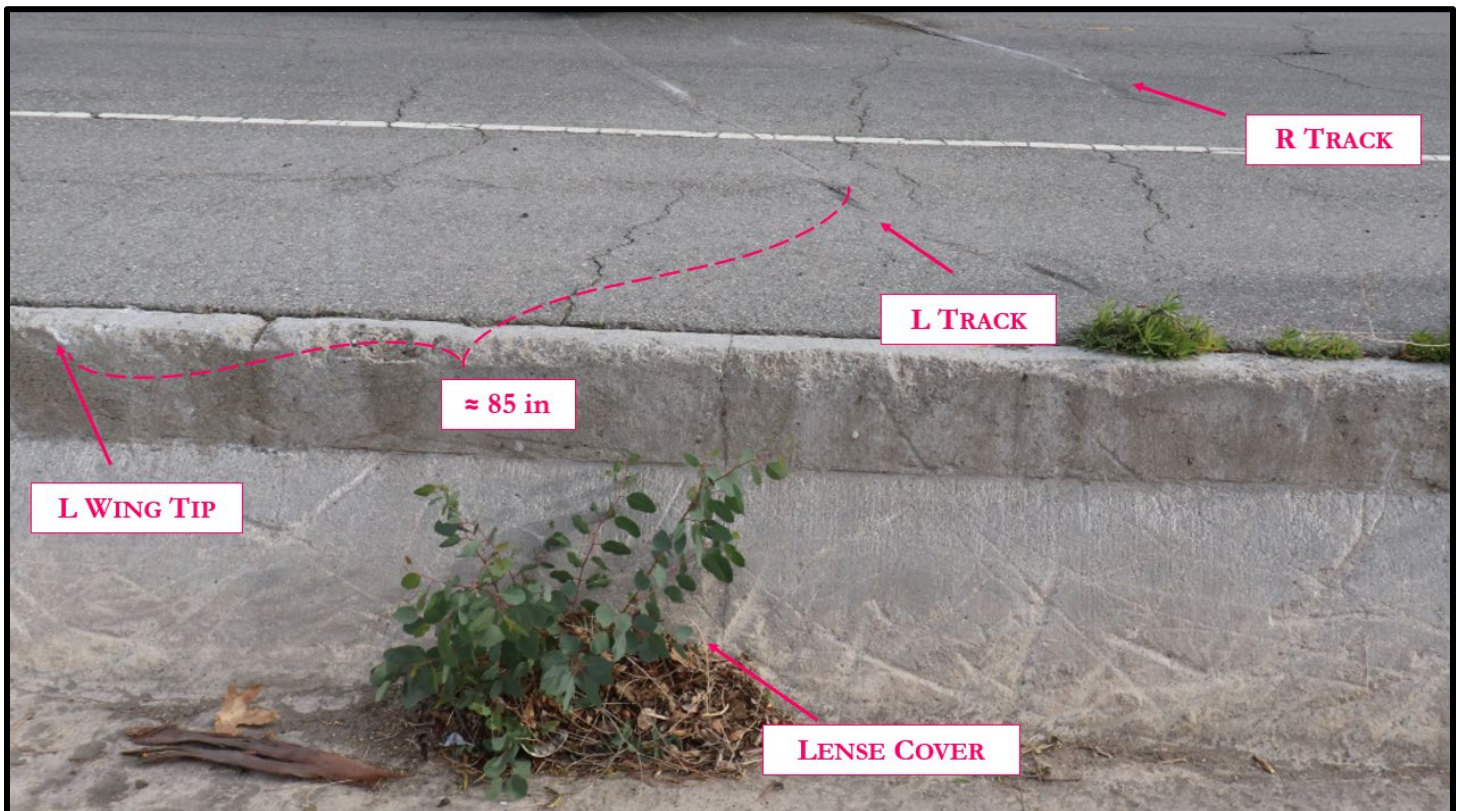


Figure 8: Initial Impact

There were several pieces of the left wheel-pant located to the left of the left-track and pieces of the right wheel-pant located to the right of the right path. About 12 ft from the first right track black smudge mark was an 18 in gouge in the concrete that was oriented perpendicular and in between the two parallel right and left tracks. Another perpendicular gouge was 15 in forward of from the first track. These gouges were consistent with propeller slashes.

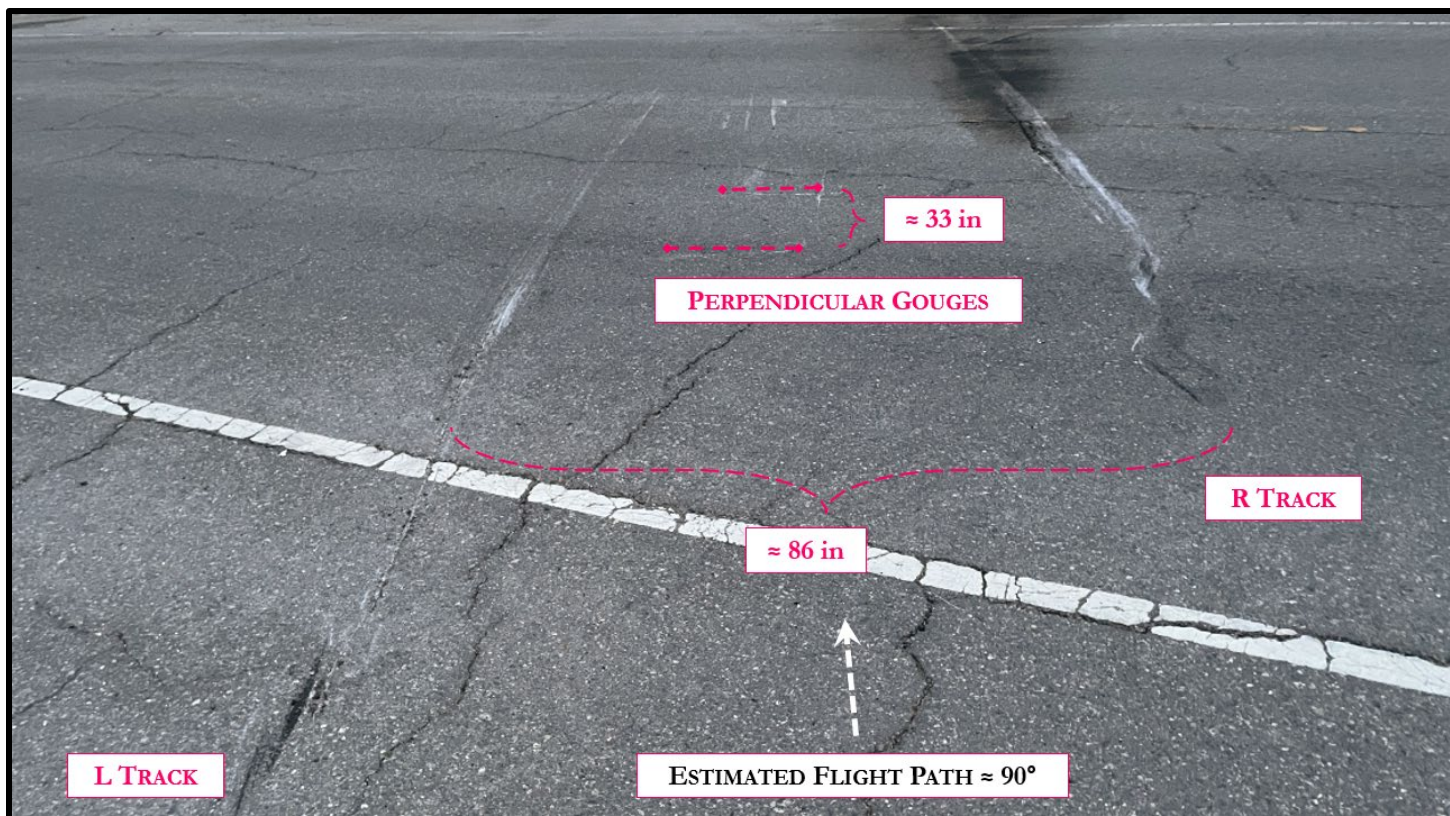


Figure 9: Start of Debris Field

At the deep groove midway in the right track, there was a black residue that feathered to the south as the track continued toward the main wreckage. After the east end of the road there was a shallow concrete ravine that paralleled the road. Located in the ravine, was an outboard portion of the left wingtip. The fiberglass was deformed and a light was hanging from the wiring. There was yellow tape on the inside of the tip, which was similar to pieces of yellow tape in the debris field on the road. The paint shop owner stated that this was the same tape they use during the painting process and should be removed during the installation of the fairings. After the ravine, there was a small dirt berm that was dark in color with no odor; the substance that was darkening the terrain is unknown. There was a second, steeper berm thereafter that had a disruption of terrain that continued up the slope to the main wreckage.



Figure 10: Black Residue Near the Right Track and the Darkened Berm

The dimensions and orientation of the witness marks were consistent with the left wing impacting the road first followed by the left wheel and then the right wheel.



Figure 11: Visual of Possible Impact Angle

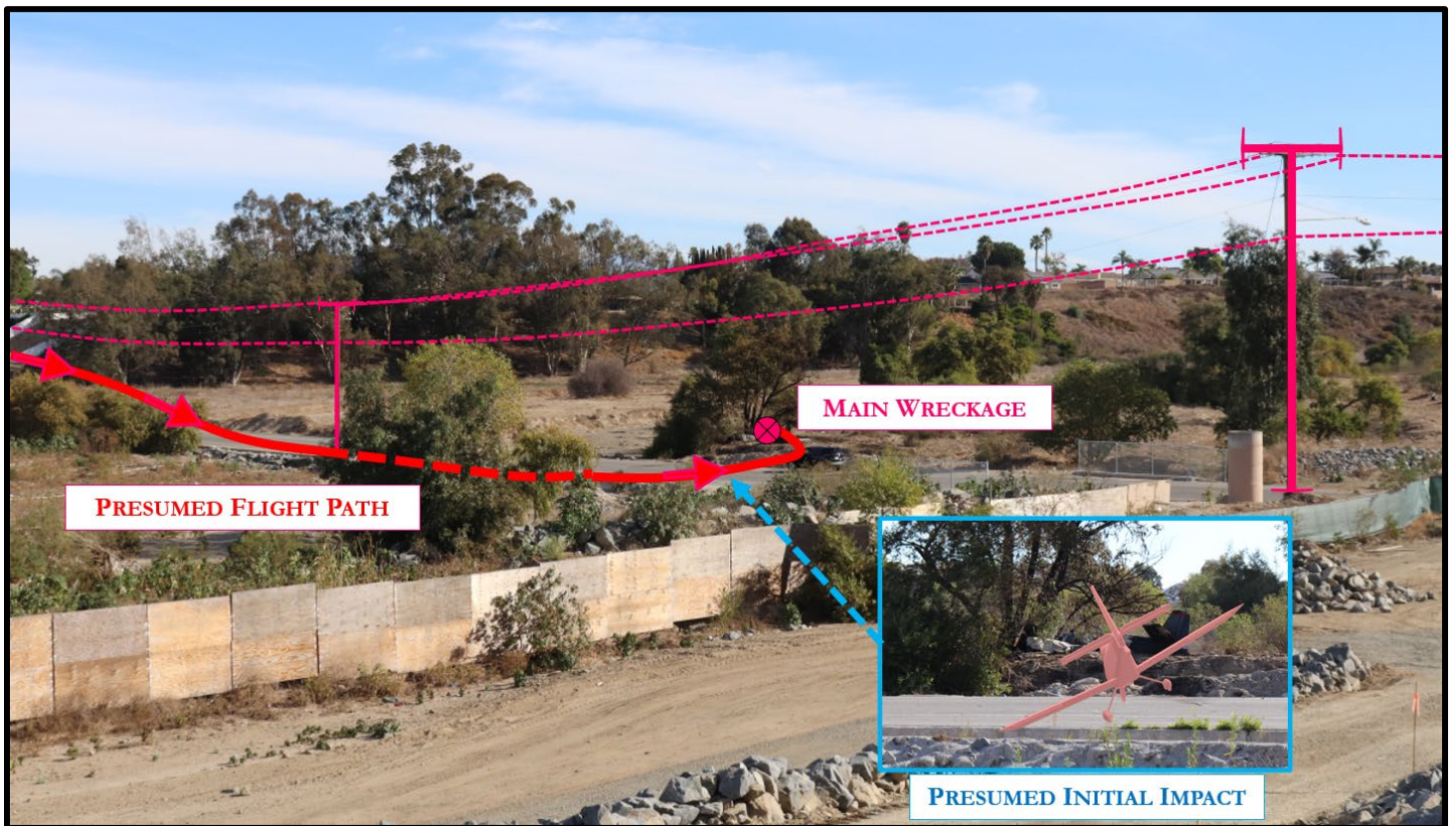


Figure 12: Presumed Impact Angle

The Vans RV-8 homebuilt airplane (s/n 82987) received its Experimental Airworthiness certification on May 23, 2023. The pilot was the builder.

The cockpit and panel were consumed by fire with none of the instruments being identifiable. The panel that was on the airplane before the accident:



Figure 13: Panel Prior to the Accident

FUSELAGE

The wings were thermally damaged with the outboard fiberglass tips consumed. The right inboard-wing and flap were consumed by fire; the aileron remained attached to its respective fittings. The left flap was attached and physically in the down position.

Partial control continuity was established onsite. The control cables were continuous to molten bellcranks and portions of the airframe. Continuity was established for the ailerons, elevator, and right rudder cable. The left rudder cable was frozen in the lightning hole and could not be moved. It appeared that material around the hole had melted around the wire binding it into place. The elevator trim tab was in the down position, consistent with the proper takeoff procedure.



Figure 14: Left Rudder Cable Through Empennage

The throttle quadrant was burned and displaced from the interior trim it had been mounted to. The throttle, manifold pressure, and mixture handles were all in the fully forward position. The handles were slightly bent to the left; the cables were

all attached to their respective levers at the bottom of the handles. Continuity could not be established from the throttle quadrant to the respective fittings on the engine components, due to impact damage and crush deformation.

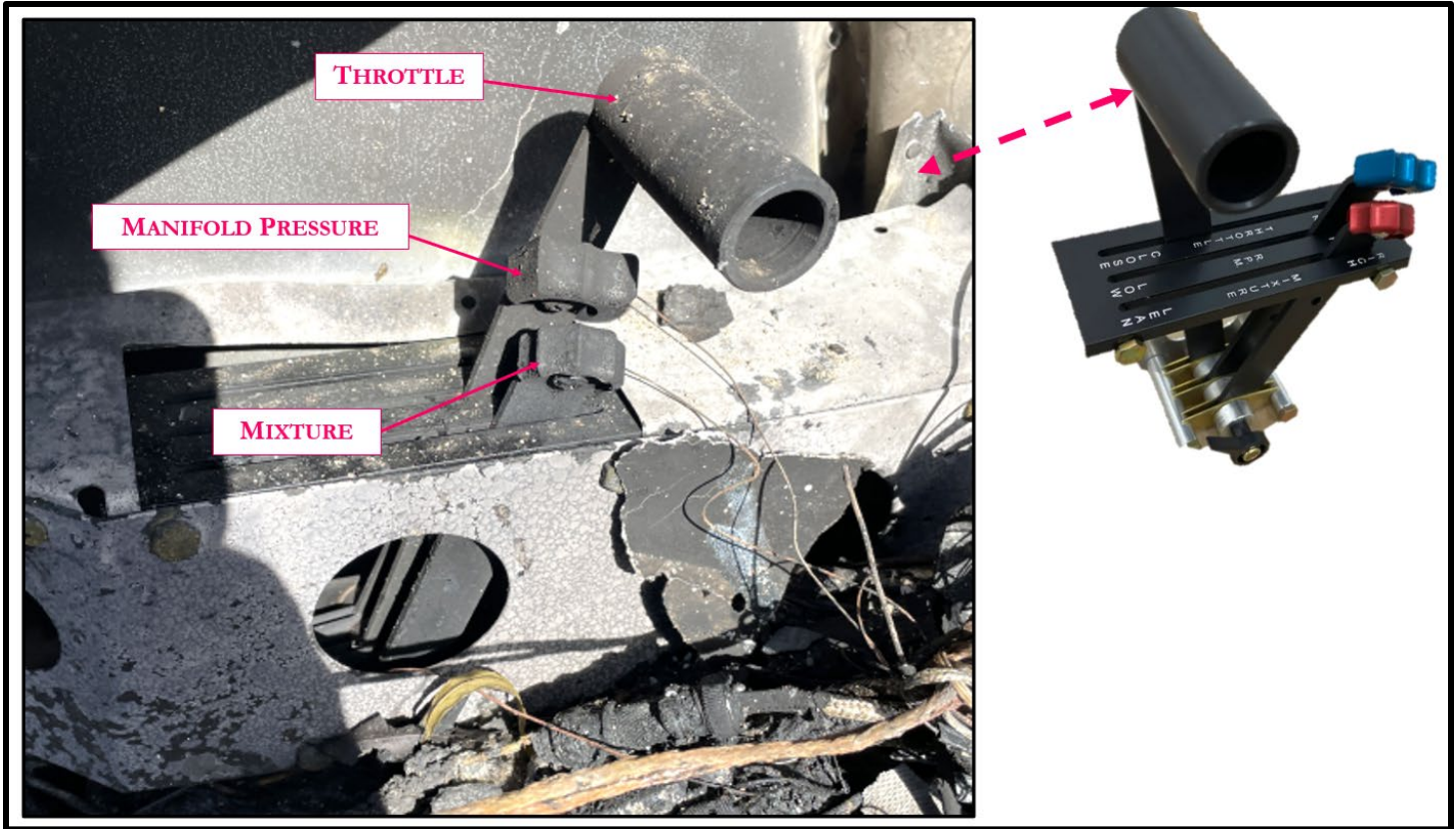


Figure 15: Throttle Quadrant (right side)



Figure 16: Throttle Quadrant Showing Cables Connect (showing left side)

The main landing gear remained with the airframe and were folded aft and located under the wings. The left and right rotors on the wheels were shaved down with flat areas. The wear was consistent with sliding against the pavement during the accident sequence.

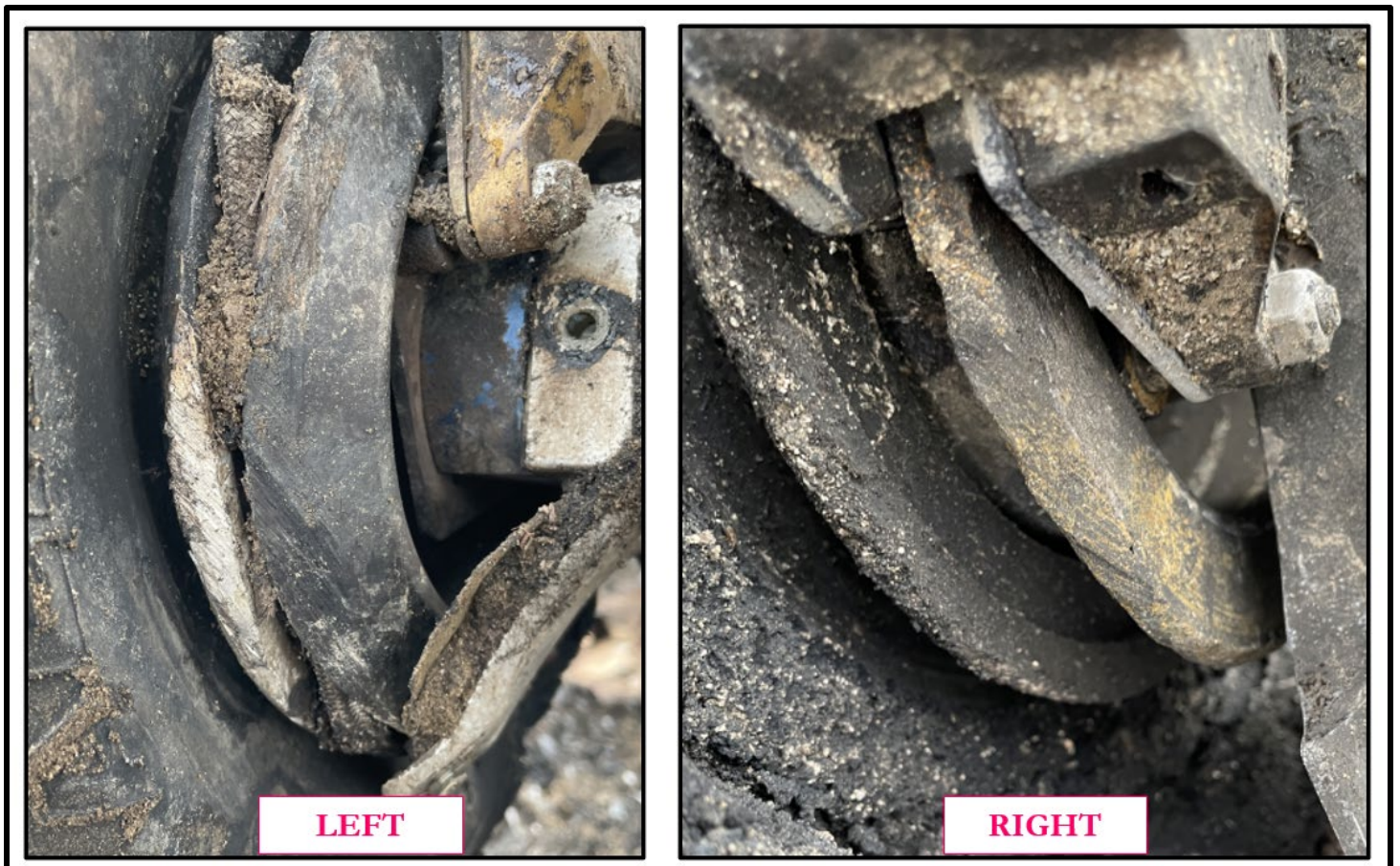


Figure 17: Damage on the Rotors on Both Wheels

The canopy was found unlatched and open (slid back).



Figure 18: Canopy Latch



Figure 19: Canopy Open

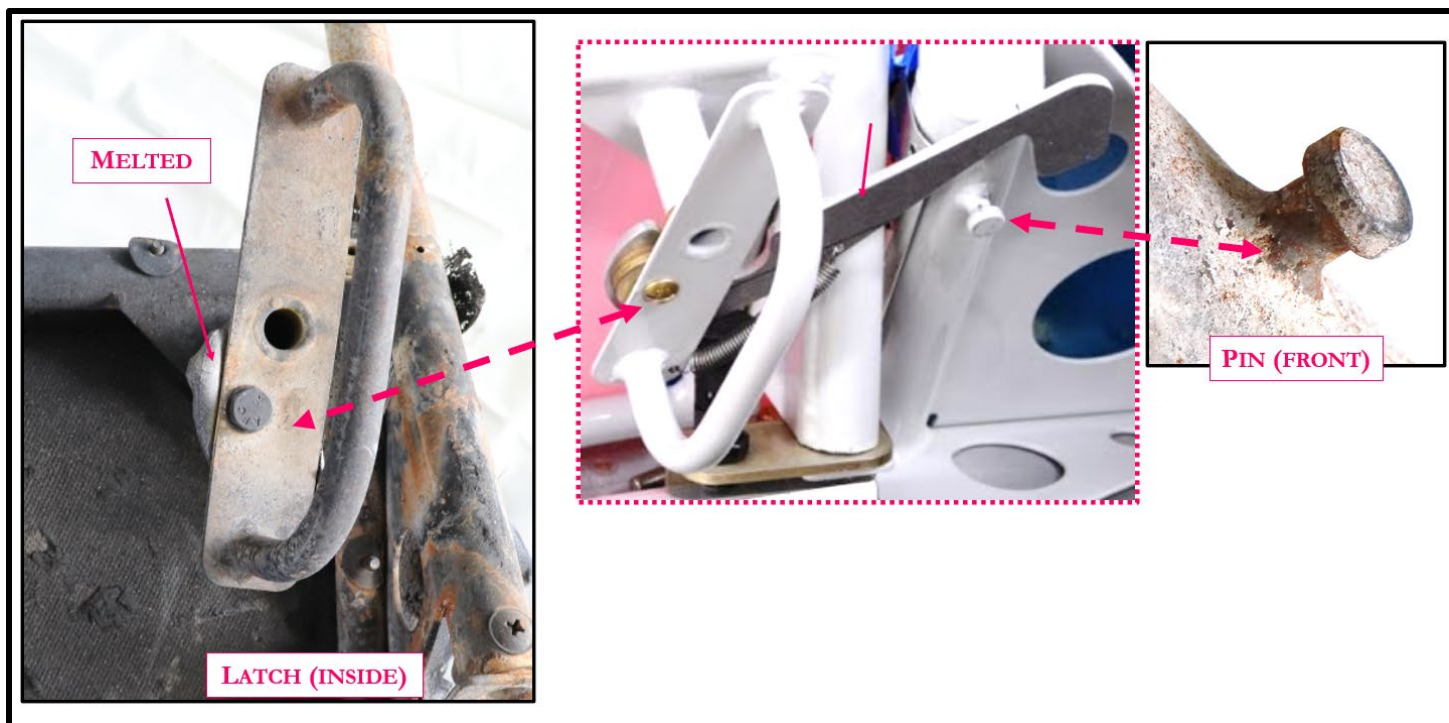


Figure 20: Latch Components (as found compared to newly built)

FUEL SYSTEM

The pilot/builder had deviated slightly from the original RV-8 fuel plan design and used several automotive parts not common in the building community. The left fuel tank was presumed empty and the right tank likely had about 10 gallons, but the quantities could not be verified because of the severe fire damage.

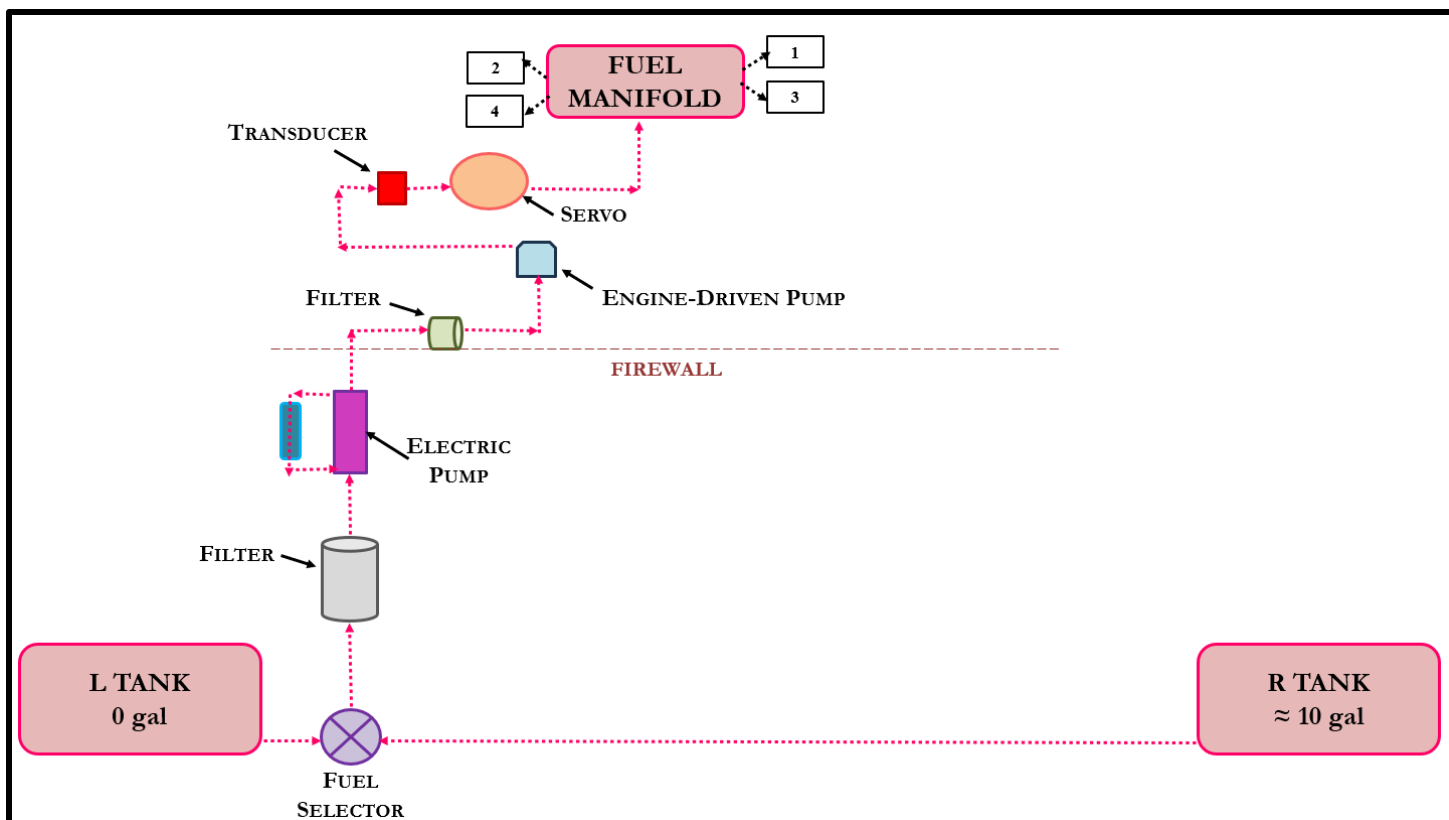


Figure 21: Fuel Diagram

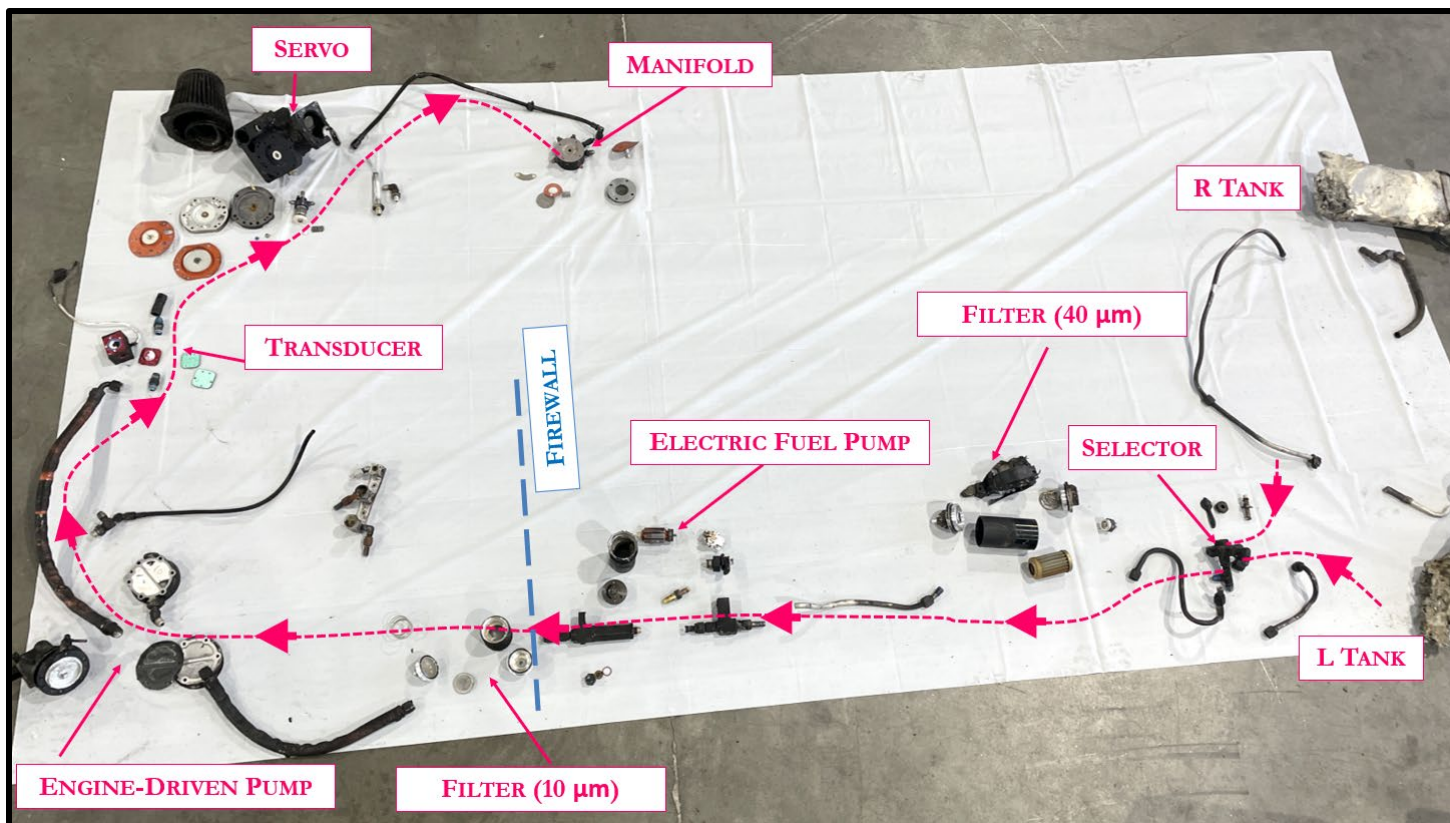


Figure 22: Fuel System (from wreckage)

The majority of the fuel system sustained major thermal damage. The right-wing fuel-cap was secured on the wing tank with the top tab flipped and affixed open. The left-wing fuel-cap was secured and flush on the wing. According to an RV-8 owner, it is common practice to keep the top tab lifted up when on the ground to help it vent (reduce the pressure from the heating on the ground).

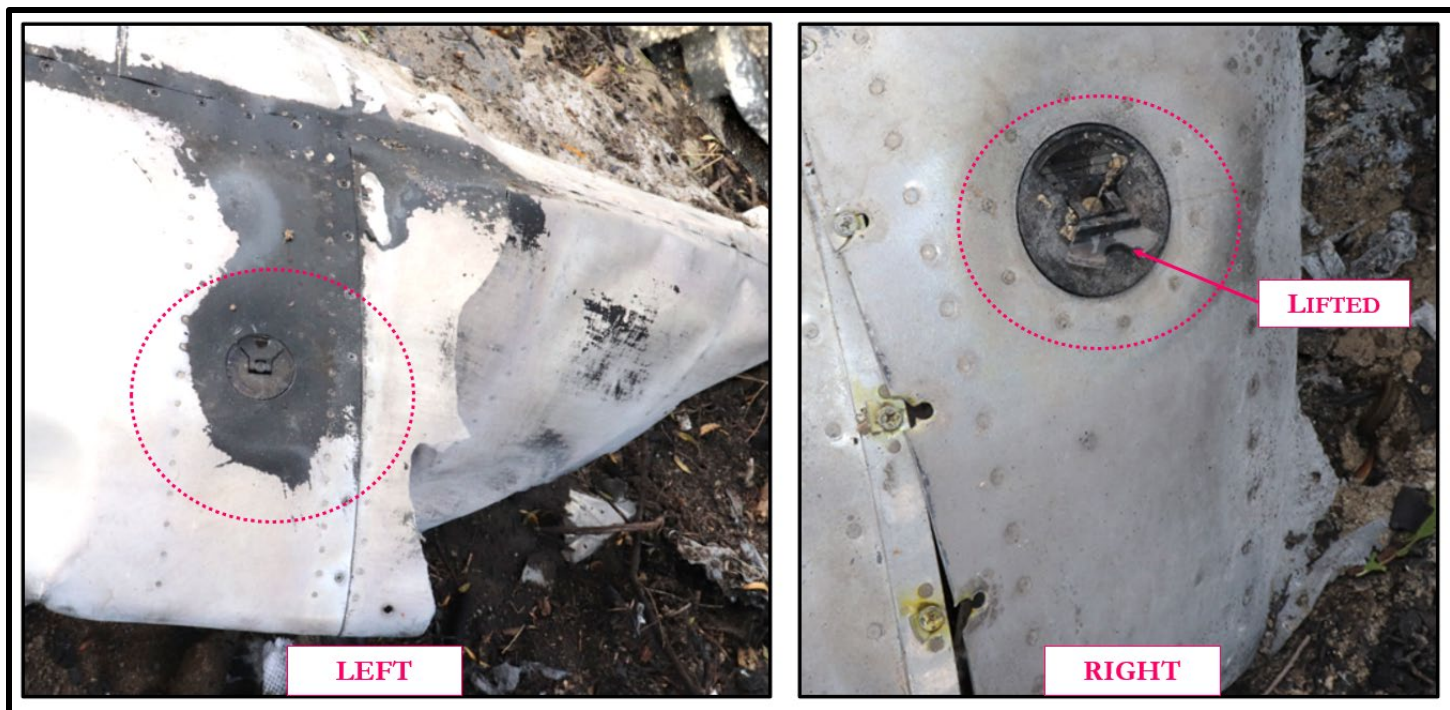


Figure 23: Fuel Caps

The fuel filter screens in both wings were melted. From the wings, the fuel lines were intact to the fuel selector valve, located on the left side of the cockpit. The selector handle was resting in a presumed “LEFT” or in-between selection, but was not attached to the stem and freely swung around with any movement.

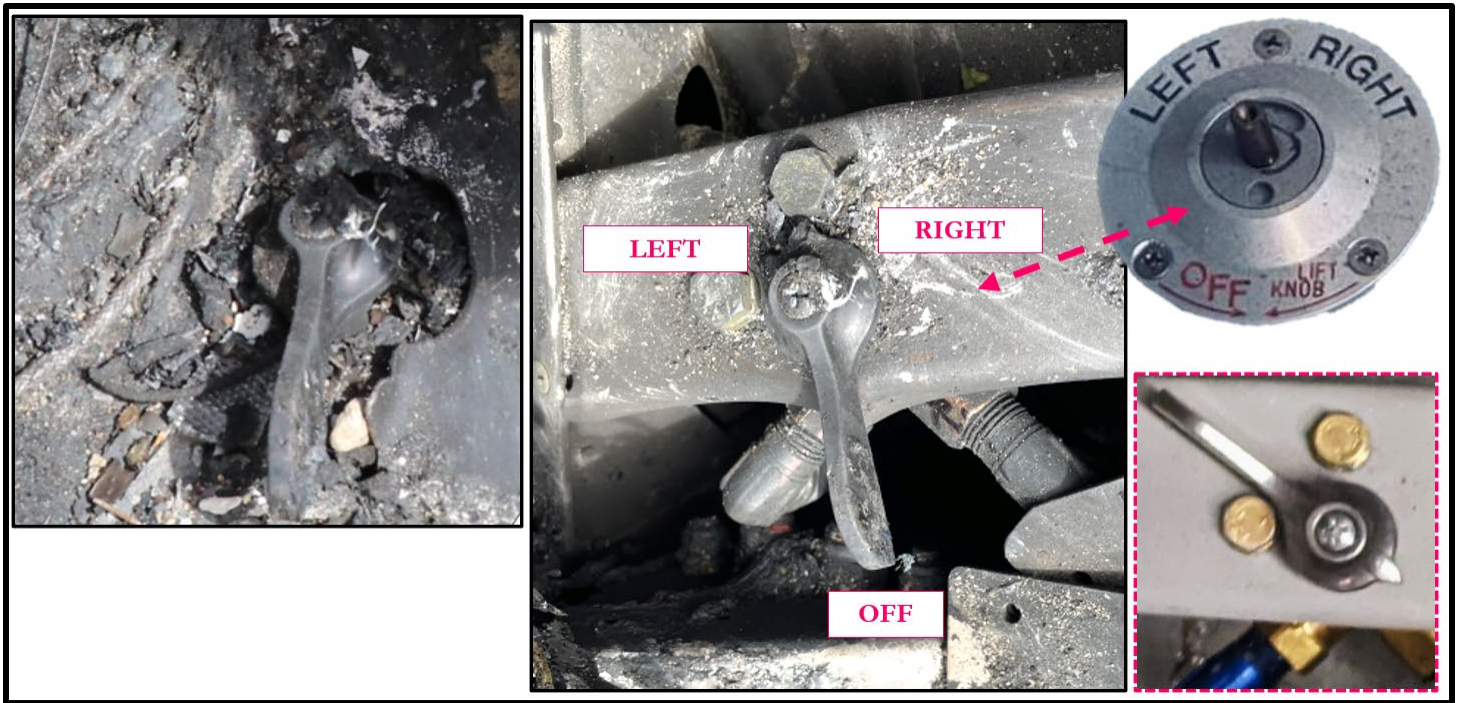


Figure 24: Fuel Selector

The fuel lines from the tank to the selector were not directly routed and instead were looped before attaching to the valve's inlet fittings. The fuel line from the selector valve's outlet to the fuel filter was kinked at the bottom of a loop. It is unknown if the crushing of the fuel line was a result of the impact. Trace amounts of liquid exited from the valve when manipulated; when subjected to water-detecting paste, the liquid tested positive for water, which is consistent with fire suppression efforts.

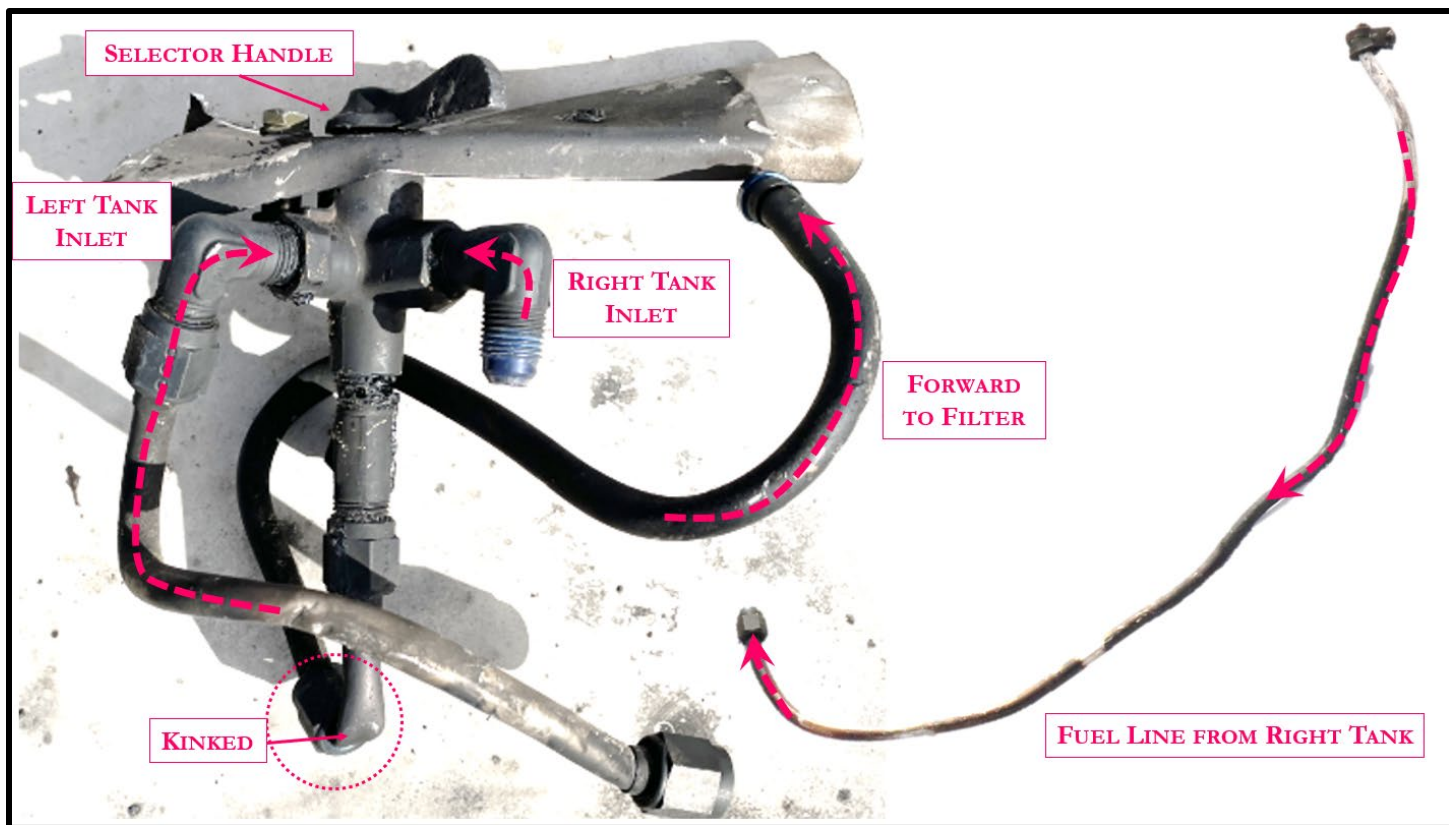


Figure 25: Fuel Lines to/from the Selector

From the fuel selector valve, there was a 40-micron fuel filter manufactured by Evil Energy. There were numerous wires that were connected to the filter, but the connection or purpose was not known. The outlet fitting was loose and the entire fitting assembly could be moved in and out of the filter body. The fuel line connected to the filter outlet was filled with a tan-colored melted material.

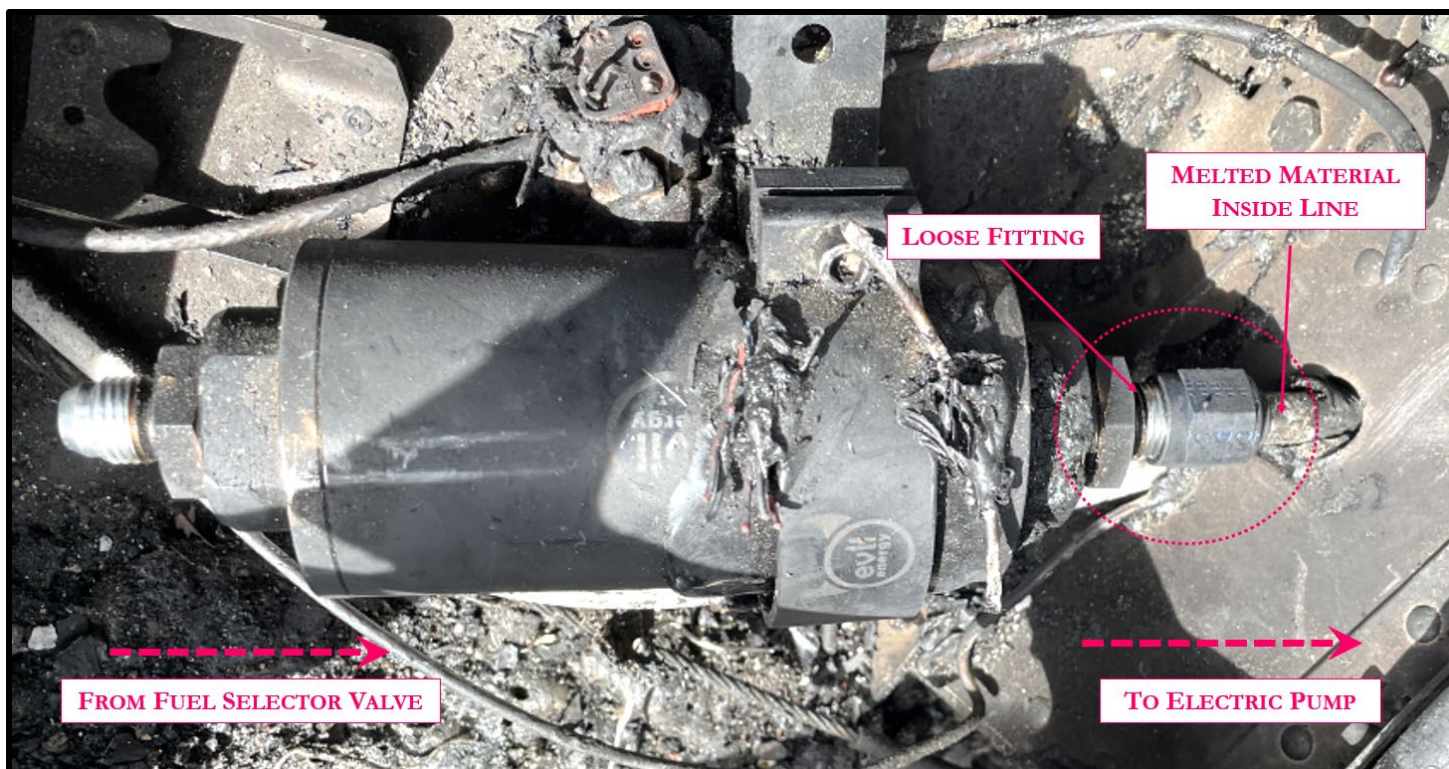


Figure 26: Fuel Filter

The fuel line continued to the electric (boost) pump¹, which was mounted on the floor, aft of the firewall. The pump and connected return line system remained affixed in the brackets. The wet-pump rotary gears could be turned. The fuel line from the pump to the firewall was a sloped line. After passing through the firewall, the fuel line was routed in a 90-degree elbow to a cylindrical 10-micron filter² with accordioned pleats. The filter was burned on the outside but remained attached to the firewall. The filter contained a hard tan material.

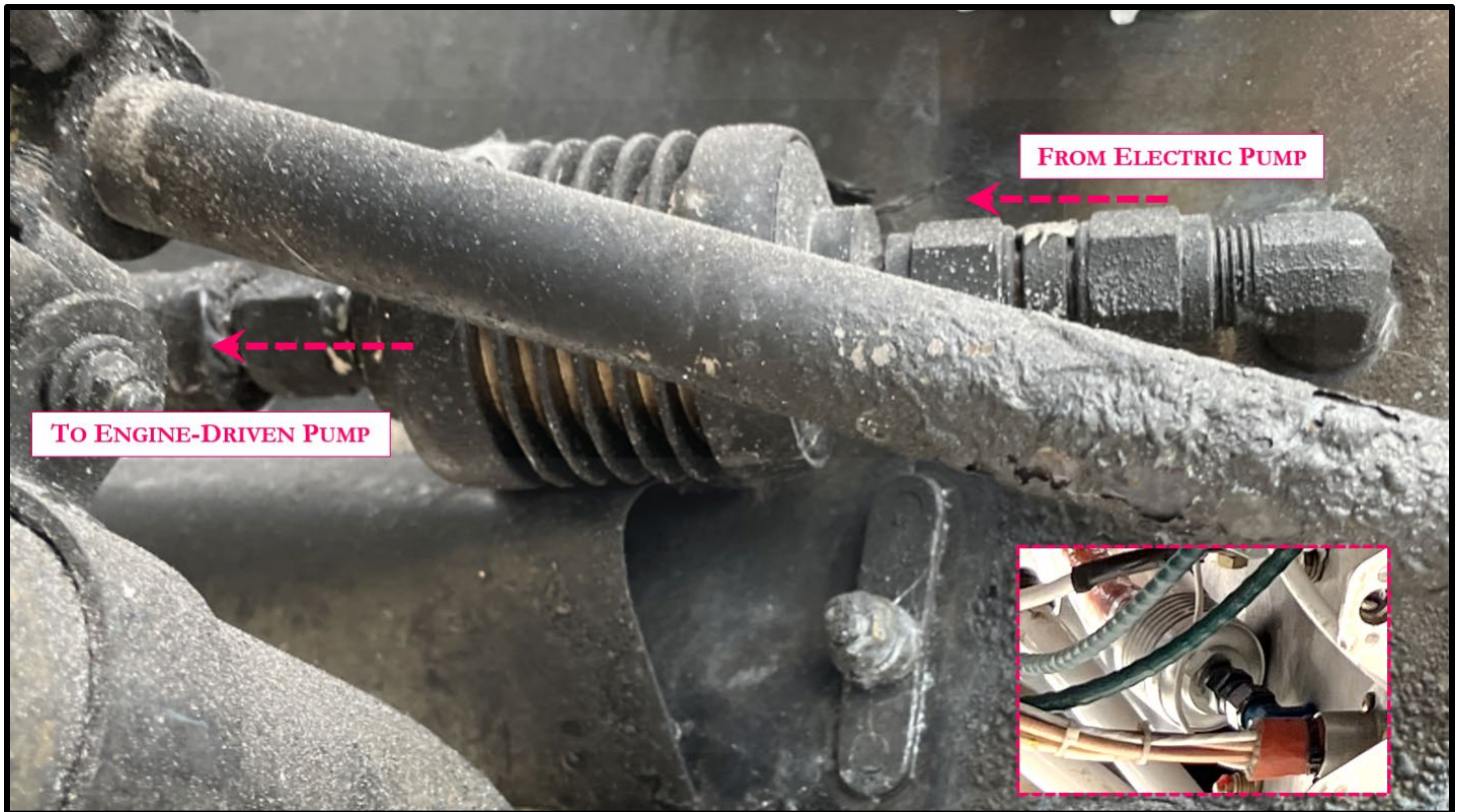


Figure 27: Fuel Filter at Firewall

¹ Looked akin to the following: [ES AIRFLOW PUMP-1 \(vansaircraft.com\)](https://vansaircraft.com/products/es-airflow-pump-1)

² Looked akin to the following: [Large Filter Archives - Golan Products](https://www.golanproducts.com/large-filter-archives)



Figure 28: Inside Firewall Fuel-Filter

The fuel line continued to the engine-drive fuel pump. Disassembly of the pump revealed that there was a hardened off-white material similar in appearance to a hard taffy. The material had air pockets and was located in the fuel chamber with no evidence of it having entered the air chamber.

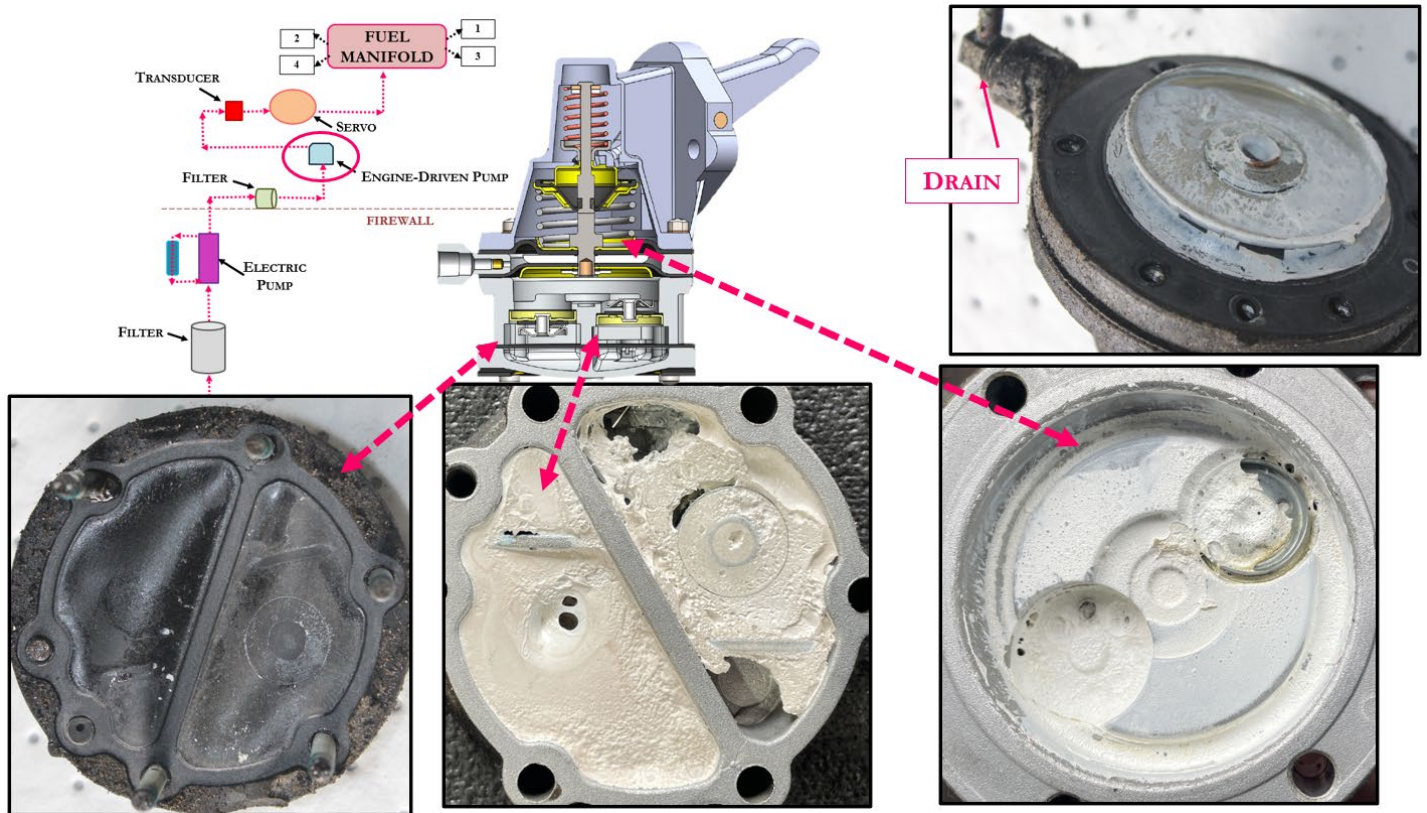


Figure 29: Inside Mechanical Fuel Pump

The fuel was then was routed forward under cylinder Nos. 4 and 2. After passing under the cylinders, there was an elbow inward where the line connected to a transducer. The transducer was not mounted, nor was the surrounding fuel lines. The transducer and surrounding fittings lightly burned with their distinctive red and blue coloration predominant. There was evidence of a white material on the inboard threads of the fittings. The inboard fitting on the union from the transducer to the servo (throttle body) was loose and could be manipulated by hand.

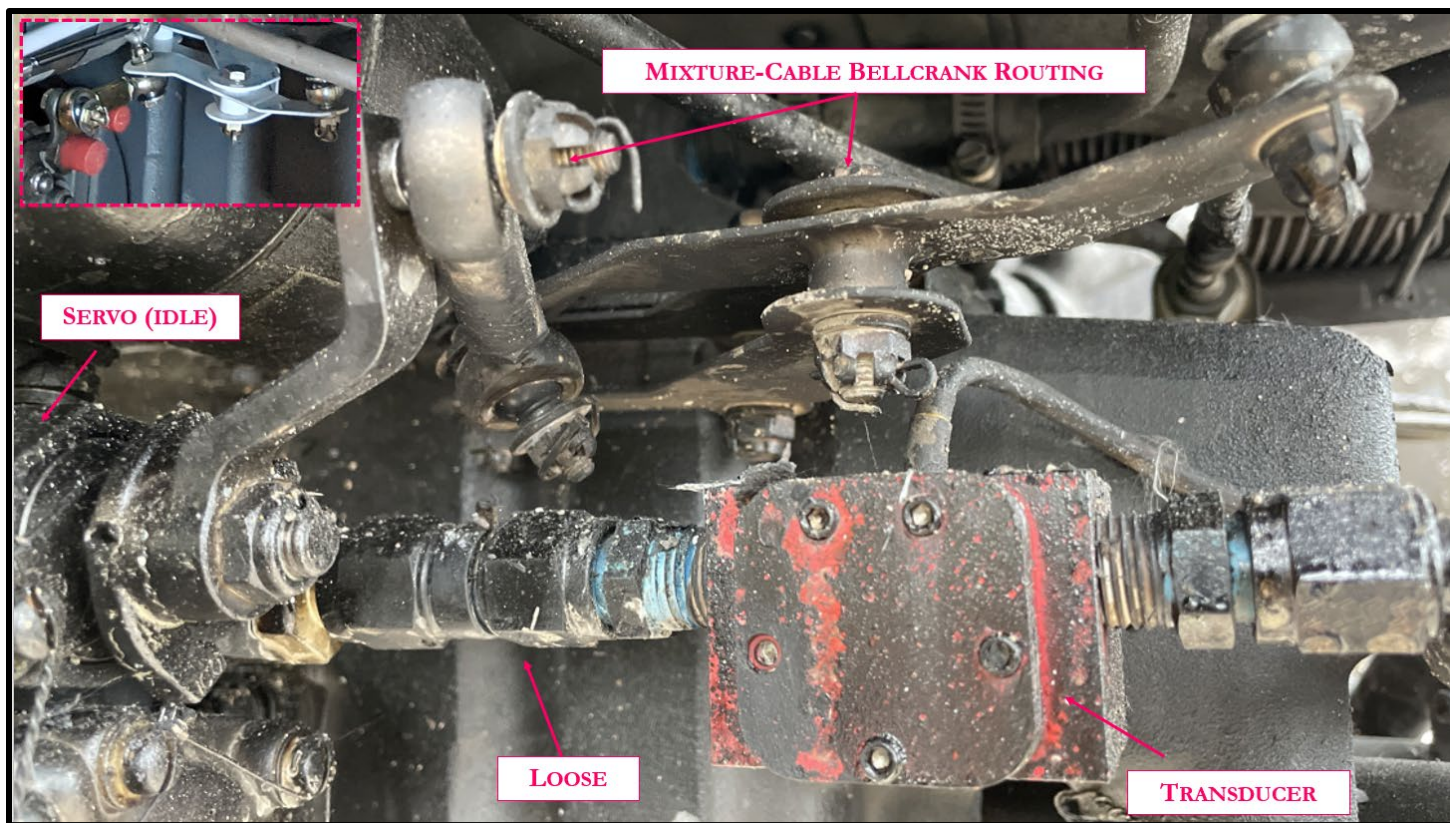


Figure 30: Transducer

Removal of the transducer revealed that there was a brute white material packed into the inlet fitting. Disassembly of the transducer revealed that the white substance was wrapped in the wheel inside the body.

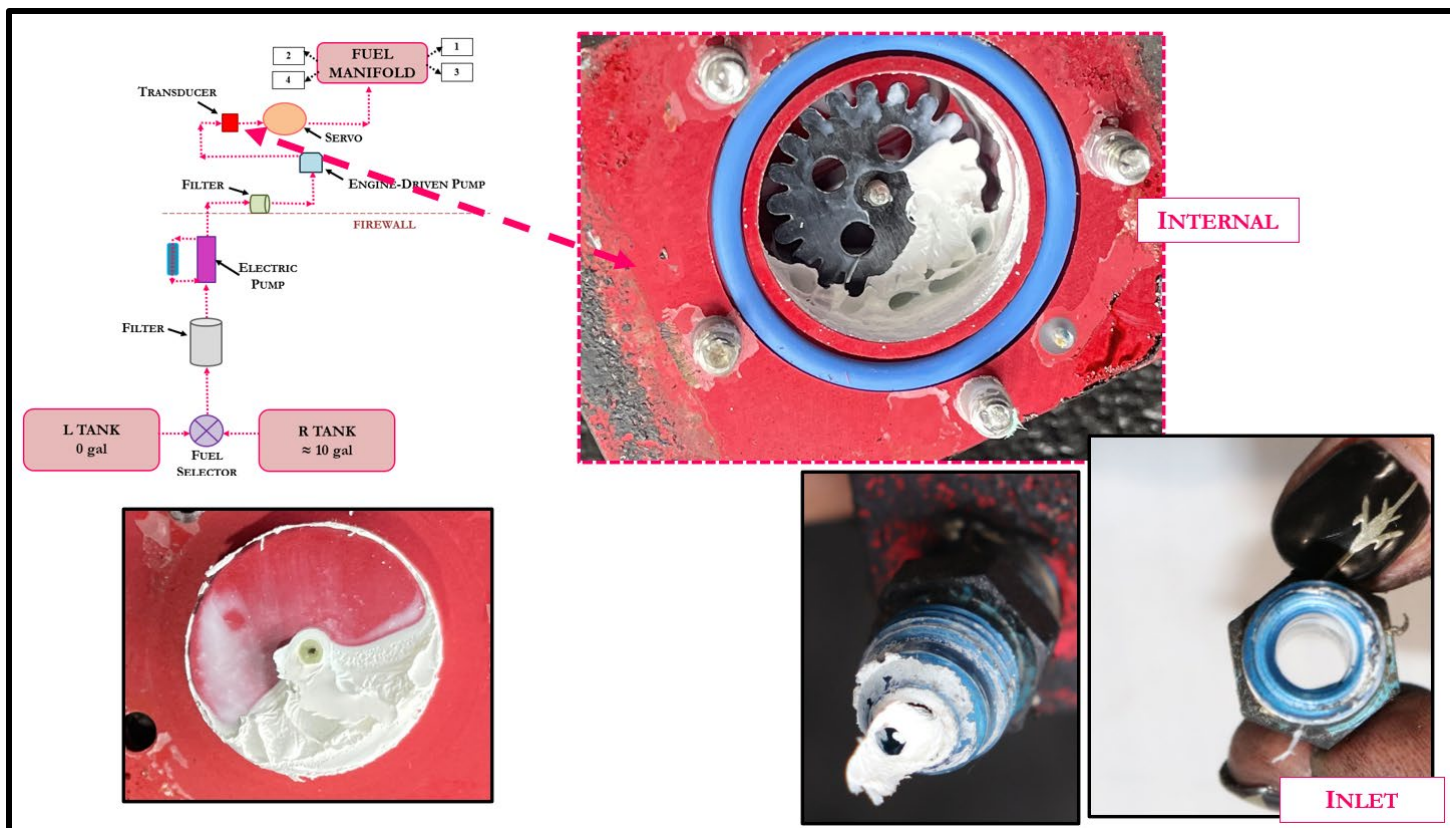


Figure 31: Inside of the Transducer

The fuel servo was attached to the engine. The mixture arm was in the idle position. Disassembly of the servo revealed that the screen was full of a bright-white material. The mixture valve had an orange material within and a trace of white material.

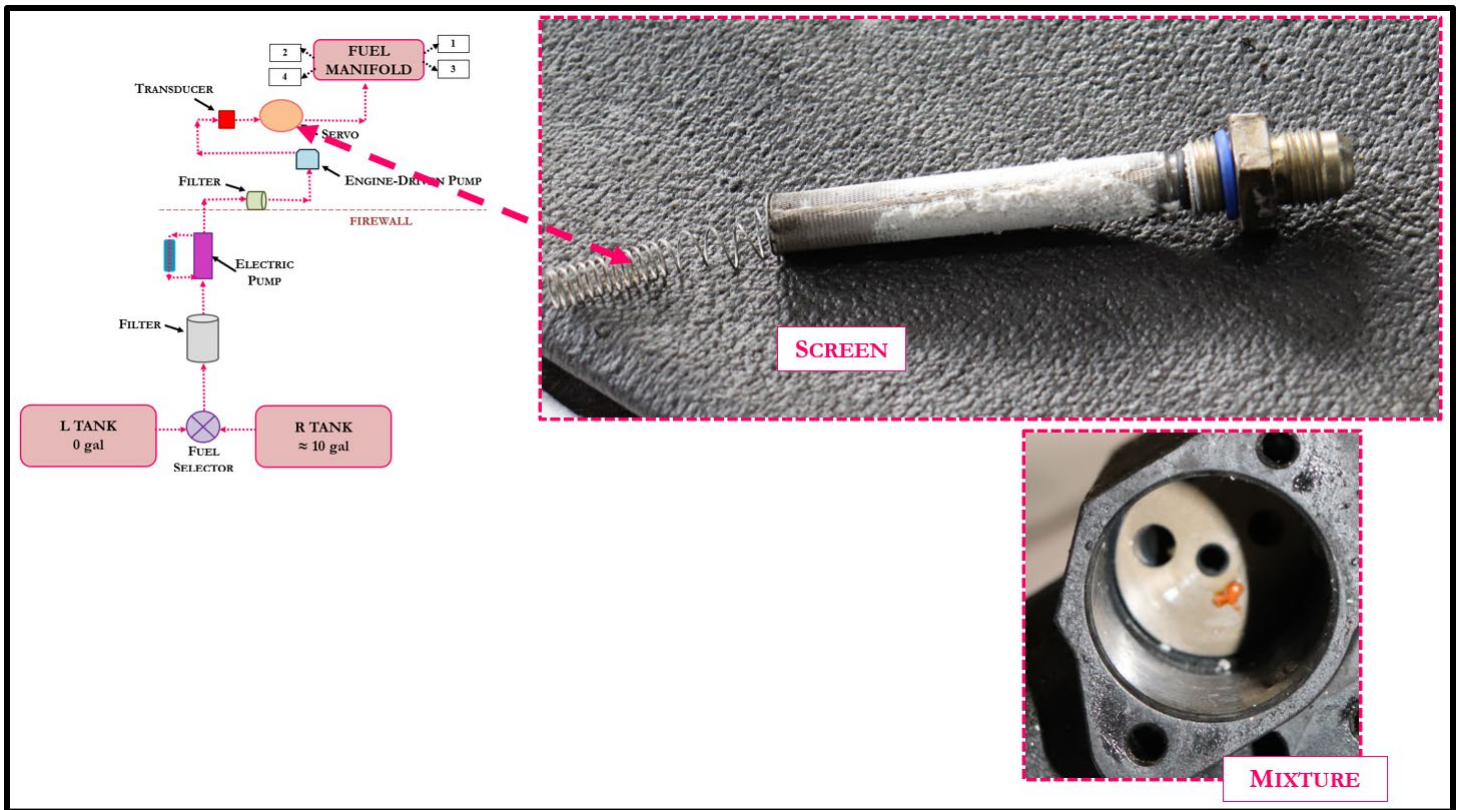


Figure 32: Servo Screen and Mixture Body

The fuel distributor (spider) was disassembled revealing the diaphragm seal was present; there was no liquid contained in the body. The diaphragm was clean and the valve was unremarkable.

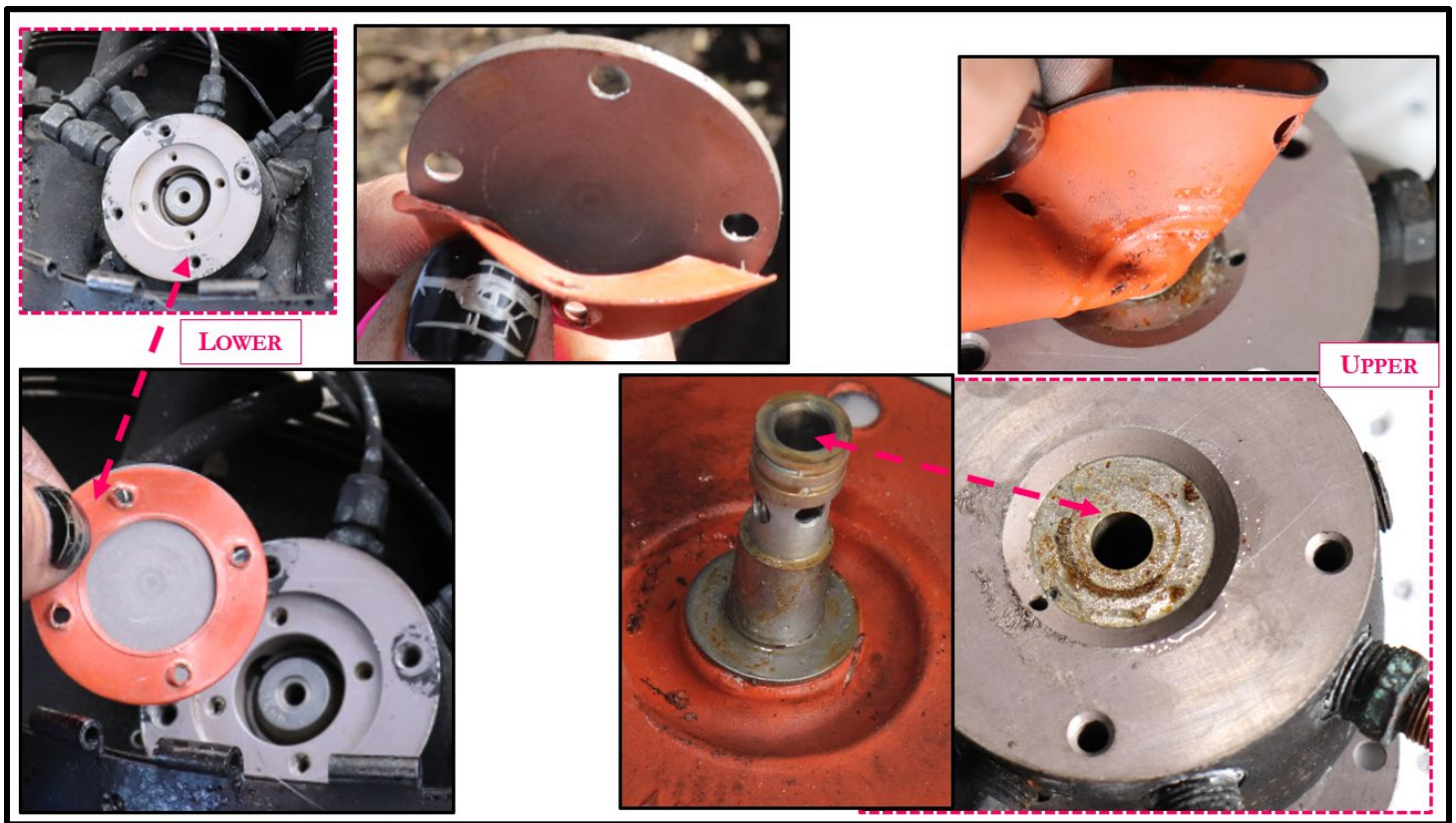


Figure 33: Fuel Distributer (spider)

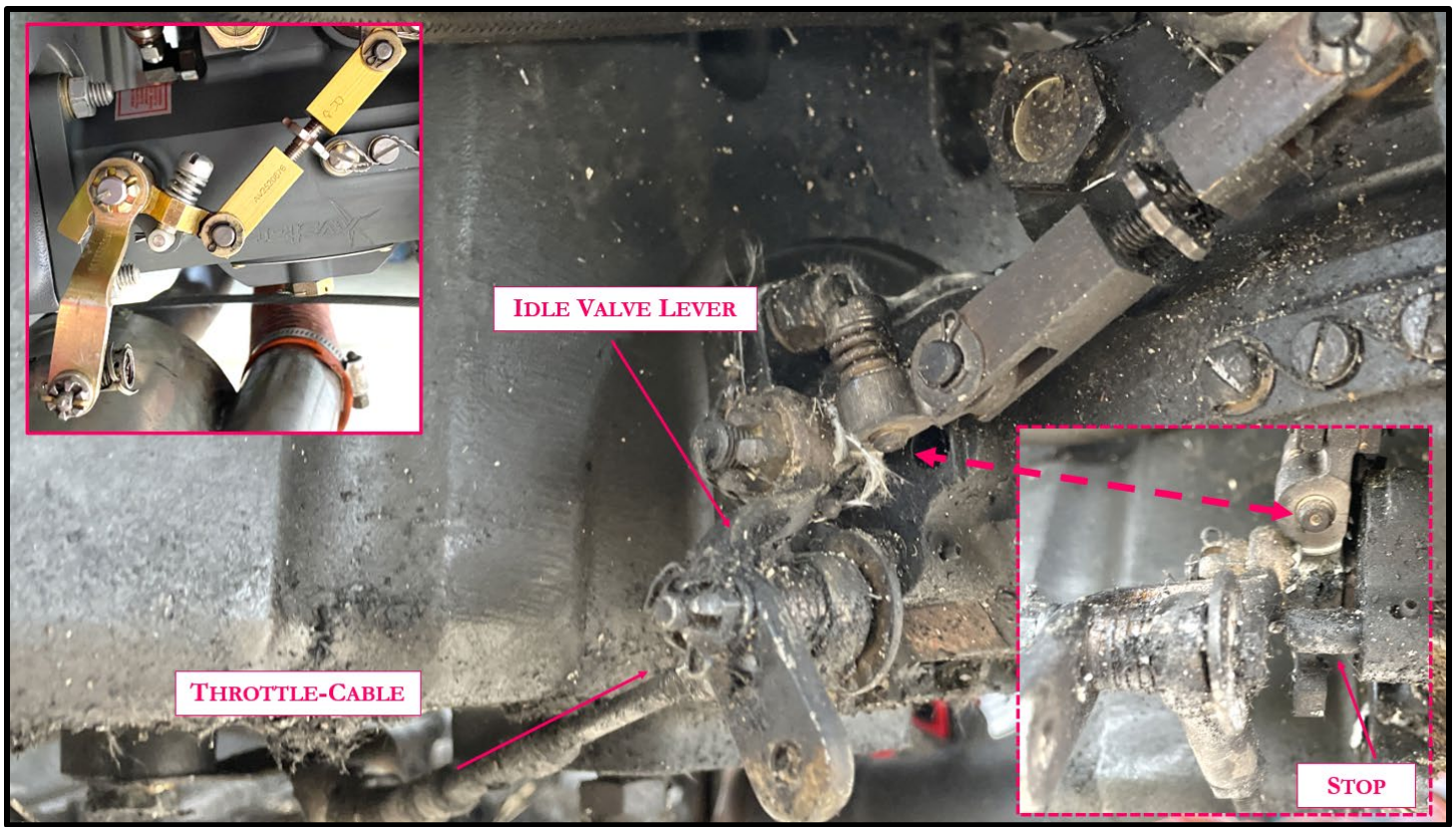


Figure 34: Throttle Control

A post accident investigation revealed that there was a white substance in the mechanical fuel pump, AF-15473.

ENGINE

U.S. Department
of Transportation
Federal Aviation
Administration



APPLICATION FOR U.S. AIRWORTHINESS CERTIFICATE

INSTRUCTIONS - Print or type. Do not write in shade
FAA use only. Submit original only to an authorized F.
additional space is required, use attachment. For spe-
complete sections II, VI, and VII as applicable.

I. AIRCRAFT DESCRIPTION	1. REGISTRATION MARKS N6948L	2. AIRCRAFT BUILDER'S NAME (Make) DAVID B LUNN	3. AIRCRAFT MODEL DESIGNATION VANS RV8	4. YR. MFG 2023
	5. AIRCRAFT SERIAL NO. 82987	6. ENGINE BUILDER'S NAME (Make) LYCOMING	7. ENGINE MODEL DESIGNATION IO-360-C1C	
	8. NUMBER OF ENGINES 1	9. PROPELLER BUILDER'S NAME (Make) HARTZELL	10. PROPELLER MODEL DESIGNATION HC-C2-YR-1BF	11. AIRCRAFT IS IN ☐ IMPORT



Figure 35: Engine Data Plate

The external examination of the Lycoming IO-360-C1C (s/n L-9829-51A) revealed no evidence of a pre-impact catastrophic mechanical malfunction or failure. The engine remained attached to the airframe via the engine mount and had sustained significant thermal damage from the post-impact ground fire. The top spark plugs were removed, and the crankshaft was rotated by hand using the attached propeller. The crankshaft rotated freely in both directions. Thumb compression was observed in proper order on all four cylinders. The complete valve train was observed to operate properly and was free of any pre-mishap mechanical malfunction. Normal lift action was observed at each rocker assembly, and clean, uncontaminated oil was present in all four rockerbox areas. Mechanical continuity was confirmed throughout the rotating and reciprocating group, valve train, and accessory section during hand rotation of the crankshaft.

The combustion chambers of each cylinder were examined via the spark plug holes using a lighted borescope. The chambers and bottom spark plug electrodes were mechanically undamaged, with no evidence of foreign object ingestion or detonation. All valves were intact and undamaged, with no observed valve-to-piston contact. The gas path and combustion signatures at the spark plugs, combustion chambers, and exhaust components exhibited coloration consistent with normal operation. No oil residue was observed in the exhaust gas path, and the exhaust system was free of obstructions.

The top spark plugs were removed, examined, and photographed. The electrodes were mechanically undamaged. According to the Champion Spark Plugs Check-A-Plug chart AV-27, the electrodes for cylinders Nos. 2, 3, and 4 showed coloration consistent with normal operation, while the electrode for cylinder No. 1 exhibited a slightly rich mixture signature.

The right magneto was securely clamped at the mounting pad. Magneto-to-engine timing was observed at 25° before top dead center for cylinder No. 1. The magneto was removed, and its drive was intact and properly safetied. Thermal damage rendered the unit inoperative. The left magneto had been replaced with an electronic ignition manufactured by SureFly, which remained securely attached at the mounting pad. Ignition timing could not be determined. The drive was secure and rotated freely by

hand. The ignition harness remained attached to the magnetos and spark plugs but had sustained thermal damage from the post-mishap ground fire.

The oil suction screen and full-flow oil filter were removed. The suction screen was free of any pre-mishap debris. The oil filter was cut open, exposing the filter media, which was also free of pre-mishap debris. No evidence of pre-mishap metal contamination was observed in the rocker boxes.

The exhaust brace on the left side was loose with no hardware visible that was attached to the engine case.



Figure 36: Exhaust Brace (loose)



Figure 37: Air Intake Filter

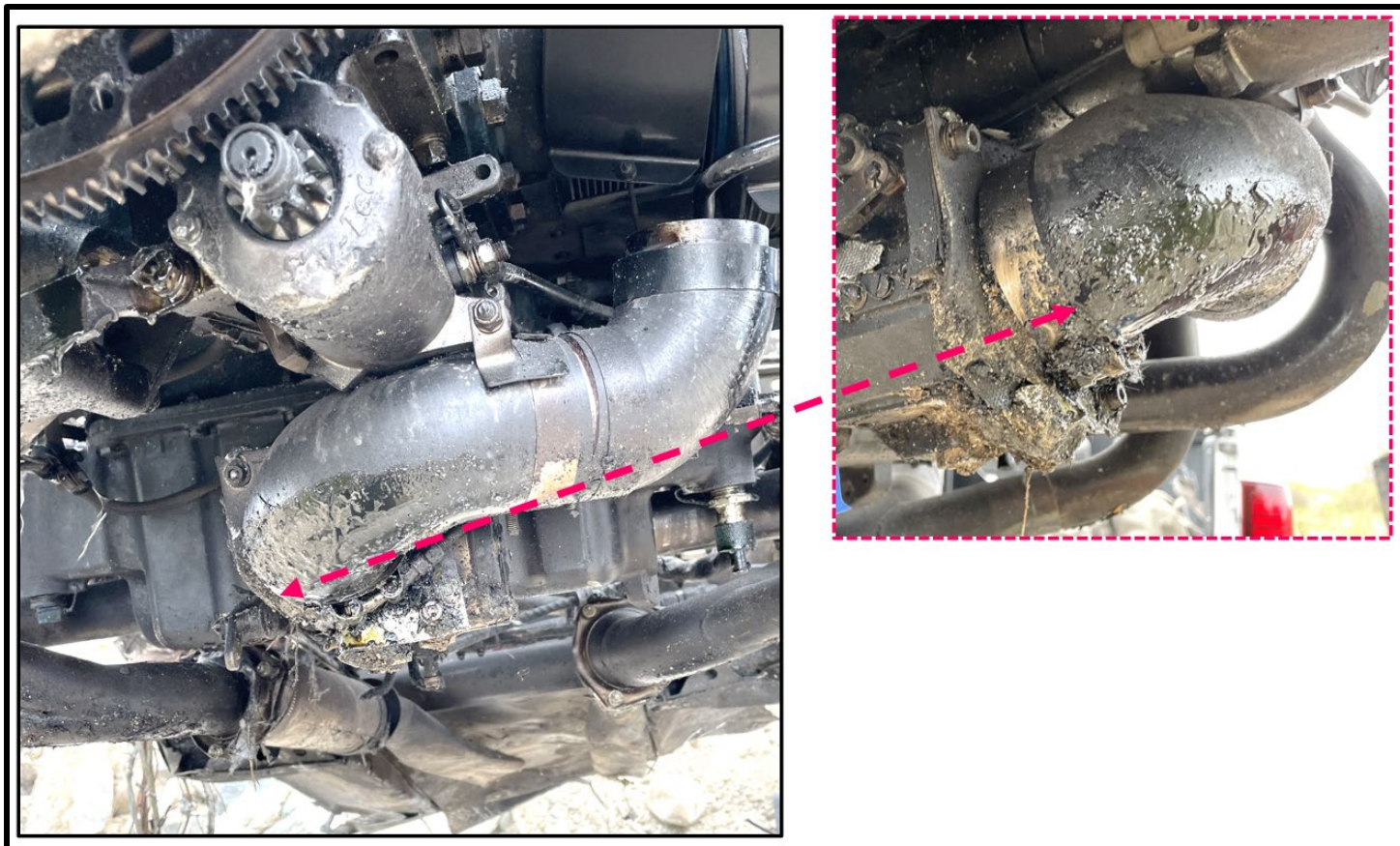


Figure 38: Oil Near Air Intake Tubing

The propeller was a two-bladed constant-speed Hartzell HC-C2-YR-1BF (s/n CH28175). The two-bladed constant speed metal propeller remained securely attached to the crankshaft flange. The fire-damaged fiberglass spinner remained partially attached to the propeller. Both propeller blades were attached to the propeller hub and exhibited leading edge gouging, torsional twisting, and chordwise striations across the cambered surface. These signatures were consistent with the absorption of rotational forces applied at the crankshaft at the time of impact. The propeller governor was securely attached at the mounting pad, and the pitch control rod was securely attached to the control arm. The governor was removed for examination; the drive was intact and rotated freely by hand. The gasket screen was free of visible contamination.

RECORDS

A review of the maintenance logbooks revealed that the airplane received its Special Airworthiness Certificate on July 15, 2023. There was no maintenance noted after that entry. The tachometer was consumed by fire. The fuel source at the Corona Airport indicated that the pilot did not receive fuel at the airport.

A review of the hangar and invoices revealed that the most recent sealant that he purchased was two-part sealant Flamemaster CS-3204 B2. The sealant in the fridge was Pro Seal Fuel Tank Sealant PS 890 (part A & B). AN invoice dated January 31, 2023 revealed that pilot purchased a quart of alcohol resistant gas tank sealer.

ORDER NO.		INVOICE NO.		CUST P.O. NO.		SHIP VIA		TERMS		INVOICE DATE	
16249075A		4467161				UPS RES GROUND		CREDIT CARD		11/06/23	
QUANTITY SHIPPED	BACK ORDERED	DESCRIPTION					PRICE	DISCOUNT	NET PRICE	TAX	EXTENSION
1		CS3204B2-QT 09-05851 FLAMEMASTER CHEMSEAL QUART CS3204 B2 QTY 1, LOT# 2305026/2303027 EXPIRES 0									

ORDER NO.		INVOICE NO.		CUST P.O. NO.		SHIP VIA		TERMS		INVOICE DATE	
16252029		3084000				UPS RES GROUND		CREDIT CARD		11/06/23	
QUANTITY SHIPPED	BACK ORDERED	DESCRIPTION				PRICE	DISCOUNT	NET PRICE		EXTENSION	
1		0890B002AM012PT 09-38560 PRO SEAL FUEL TANK SEALANT PS 890 B2 PINT QTY 1, EXPIRES 07/20/24									

ORDER NO.		INVOICE NO.	CUST P.O. NO.	SHIP VIA	TERMS	INVOICE DATE	
15744974		7941728		UPS RES GROUND	CREDIT CARD	01/31/23	
QUANTITY SHIPPED	BACK ORDERED	DESCRIPTION		PRICE	DISCOUNT	NET PRICE	EXTENSION
1		09-03477 ALCOHOL RESISTANT GAS TANK SEALER QUART]					
2		05-01869 CURTIS DRAIN VALVES CCA-1550 THANK YOU FOR YOUR ORDER PROP 65 WARNING - CANCER AND REPRODUCTIVE HARM. https://www.p65warnings.ca.gov					



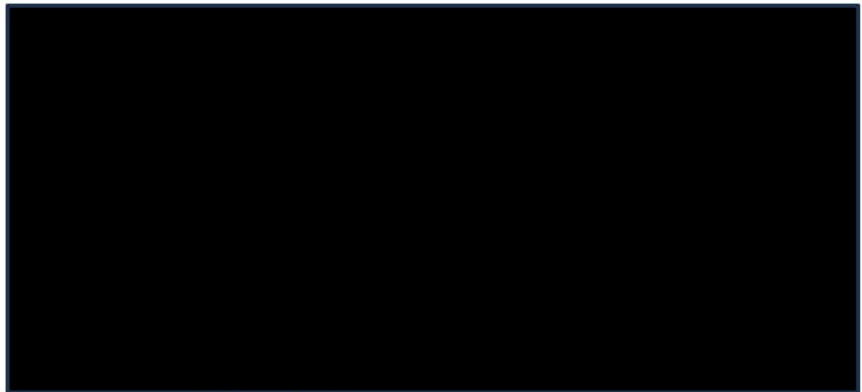
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Overview

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Note: For Experimental Aircraft Only!

The following caution is provided by the manufacturer of the sealer:

Caution! Before introducing sealer into the tank, the entire interior of the tank must be dry. If only one small area of the tank is not dry or has foreign matter that may keep the sealer from adhering, the sealer will not stick to those areas and could come loose and float around in your tank and eventually come through the fuel pick up tube and clog the fuel pump and carburetor.

PILOT INFORMATION

DAVID B LUNN

Pilot Certificate 2700654 (PRIVATE PILOT ASEL, AMEL, INSTRUMENT), was a 60-year-old male. This pilot reported civil flight experience that included 2200 total and 40 hours in last six months as of exam dated 12/7/2023. This pilot was 71 inches tall and weighed 240 lbs. at the time of the last exam. This pilot was issued a Third Class Medical Certificate with the following limitation: "Must use corrective lenses to meet vision standards at all required distances."

The pilot purchased the airplane kit in April 2022 and received an airworthiness certificate on May 11, 2023. He owned a Piper Arrow II from 2005 to April 2020.

AERODROME INFORMATION

Corona Municipal Airport (AJO) was an uncontrolled airport located about 3 miles northwest of the town of Corona, California. The airport's elevation was 533 ft mean sea level (msl), and was equipped with 1 runway: Runway 07/25 was 3,200 ft by 60 ft comprised of asphalt with a 0.32 degree uphill slope. The runway had an approximate 200-ft displaced threshold and a windsock located about 1,600 ft from that threshold

SOCIAL MEDIA POSTS

