

# National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA24FA160

## WRECKAGE EXAMINATION

June 10, 2024

## TABLE OF CONTENTS

|                                        |    |
|----------------------------------------|----|
| A. ACCIDENT.....                       | 3  |
| B. WRECKAGE EXAMINATION.....           | 3  |
| C. SUMMARY.....                        | 3  |
| D. DETAILS OF THE EXAMINATION.....     | 3  |
| 1.0 ACCIDENT SITE .....                | 3  |
| 2.0 AIRFRAME EXAMINATION.....          | 6  |
| 2.1 Fuselage.....                      | 6  |
| 2.2 Empennage .....                    | 7  |
| 2.3 Aircraft Wings.....                | 11 |
| 2.4 Landing Gear.....                  | 15 |
| 2.5 Cockpit.....                       | 15 |
| 2.6 Survivability.....                 | 18 |
| 2.7 Fuel/Fuel System.....              | 19 |
| 3.0 ENGINE EXAMINATION .....           | 19 |
| 3.1 Induction and Exhaust System ..... | 25 |
| 3.2 Magnetos .....                     | 26 |
| 3.3 Ignition System.....               | 26 |
| 3.4 Fuel System.....                   | 27 |
| 4.0 PROPELLER EXAMINATION .....        | 30 |

## **A. ACCIDENT**

Location: Mulberry, Florida  
Date: April 2, 2024  
Time: 1038 EDT  
1438 UTC  
Motorglider: N622PC; Aeromarine Merlin Lite

## **B. WRECKAGE EXAMINATION**

|                   |                                                                         |
|-------------------|-------------------------------------------------------------------------|
| IIC               | Joshua Young<br>National Transportation Safety Board<br>Washington, DC  |
| Investigator      | Kurt Gibson<br>National Transportation Safety Board<br>Washington, D.C. |
| Party Coordinator | Ryan Sebek<br>Federal Aviation Administration<br>Orlando, FL            |

## **C. SUMMARY**

On April 2, 2024, at 1038 eastern daylight time, an experimental amateur built merlin lite motorglider, N622PC, was substantially damaged when it was involved in an accident near Mulberry, Florida. The private pilot sustained fatal injuries. The motorglider was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

## **D. DETAILS OF THE EXAMINATION**

### **1.0 Accident Site**

The motorglider came to rest on runway 14/32 at South Lakeland Airport (X49), Lakeland, FL about 1500 ft from the threshold of runway 14.



**Photo 1: Google Earth view of the accident site.**



**Photo 2: Google Earth view with distance remaining from the accident site to the end of the available grass area.**



**Photo 3: View of the motorglider at the accident site. (FAA Photo)**



**Photo 4: View of ground impact scars.**

## **2.0 Airframe Examination**

### **2.1 Fuselage**

The fuselage had sustained substantial damage and displayed crushing and buckling in multiple locations.



**Photo 5: View of damage to the fuselage.**

## **2.2 Empennage**

The empennage was partially separated and remained attached to the fuselage by the rudder and elevator control cables and rods and the bottom skin. The vertical stabilizer and rudder remained attached at all attachment points and were undamaged. Control continuity was confirmed from the rudder to the flight controls in the cockpit through a fractured rod end consistent with overload. The horizontal stabilizer and elevator remained attached at all attachment points and were

undamaged. Control continuity was confirmed from the elevator to the flight controls in the cockpit. The electric trim was visually in a neutral position and remained attached to the elevator at all attachment points.



**Photo 6: View of damage to the bottom of the empennage and fuselage.**



**Photo 7: View of the vertical stabilizer and rudder.**



**Photo 8: View of the left horizontal stabilizer and elevator.**



**Photo 9: View of the right horizontal stabilizer and elevator.**



**Photo 10: View of the elevator trim tab.**

## **2.3 Aircraft Wings**

The right wing remained attached to the fuselage at all attachment points. The leading edge was impact crushed aft along the full length. The right aileron remained attached to the wing at all attachment points and exhibited impact damage. Continuity was confirmed from the right aileron flight control surface to the controls in the cockpit. The right flap was in the up position and remained attached to the wing.

at all attachment points. Continuity was confirmed from the right flap control surface to the flight control in the cockpit.



**Photo 11: View of damage to the right wing.**



**Photo 12: View of damage to the right aileron.**

The left wing remained attached to the fuselage at all attachment points. The left wing was impact fractured outboard of the flap and remained attached through the left aileron control rod. The outboard two thirds of the left wing leading edge exhibited impact crushing aft. The left aileron remained attached at all attachment points and the inboard trailing edge corner exhibited impact damage. Continuity was confirmed from the left aileron flight control surface to the flight controls in the cockpit. The left flap was in the up position and remained attached at all attachment points. Continuity was confirmed from the left flap flight control surface to the flight control in the cockpit.



**Photo 13: View of damage to the left wing.**



**Photo 14: View of damage to the outboard left wing.**

## 2.4 Landing Gear

The nose landing gear remained attached to the forward fuselage and was impact crushed up and aft. The main landing gear remained attached to the fuselage and were undamaged.



**Photo 15: View of the landing gear.**

## 2.5 Cockpit

The cockpit sustained a significant amount of impact damage and was crushed aft. The iPad normally mounted by hook-and-loop fasteners to the center of the instrument panel was impact separated and destroyed. The IFD-NET electronic flight instrument system remained installed in the instrument panel. The instrument was removed to see if a memory card was installed, a memory card was not installed. The left fuel gauge was impact separated from the instrument panel, and indicated 0, no slap mark from the indication needle was observed. The avionics switch was in the on position. The right fuel on/off lever was in the on position, the left fuel on/off lever was halfway between on and off and was bent from impact. The master switch was in the on position. The throttle was fully aft near the idle position and operated

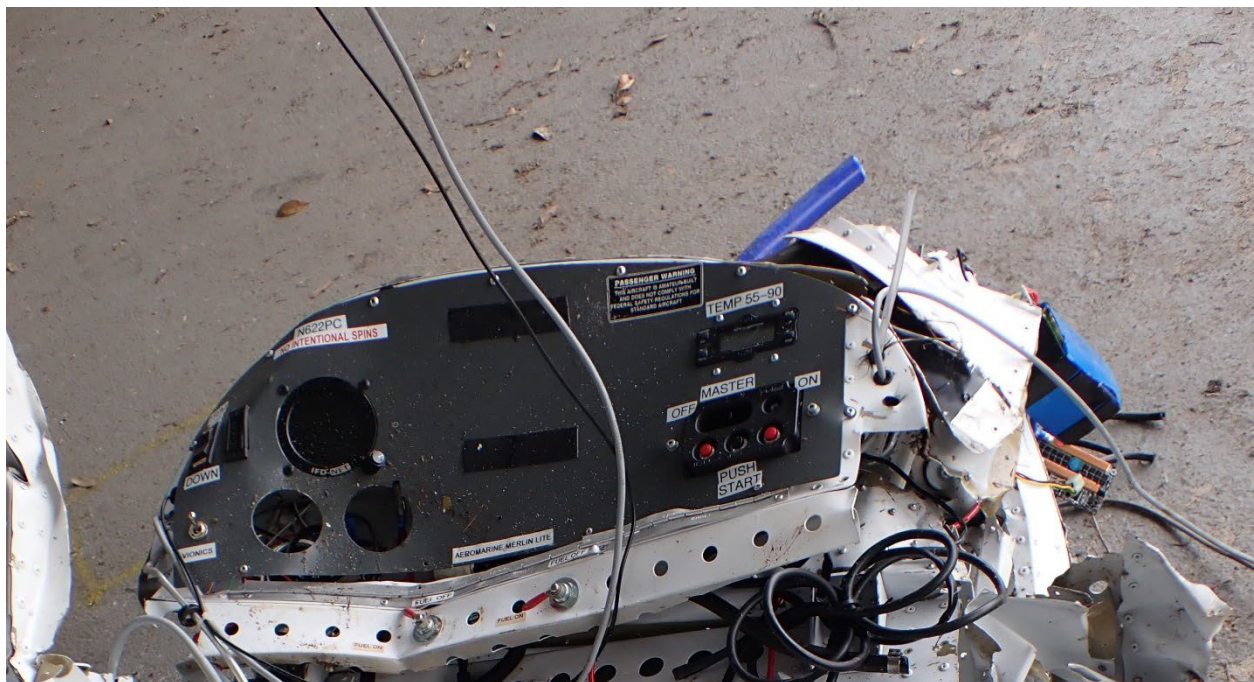
normally. The flight control stick and rudder pedals exhibited impact damage. The flap handle was found stowed in the up position.



**Photo 16: View of damage to the cockpit area.**



**Photo 17: View of the flap handle as found.**



**Photo 18: View of the instrument panel.**

## 2.6 Survivability

The motorglider was equipped with a 4-point harness. Both lap belt attachments remained attached to the fuselage. The shoulder harness attachment point was partially torn from the airframe attachment point. The seatbelts had been cut by first responders to facilitate recovery of the pilot. The seat belt buckle remained buckled and operated normally. The pilot was wearing a helicopter type helmet.



**Photo 19: View of the shoulder harness attachment point pulled from the airframe.**

## **2.7 Fuel/Fuel System**

Both wing fuel tank caps remained seated in place. There was a small amount of fuel found in the left fuel tank. A sample of fuel was drained from the tank and the fuel had the color consistency of a fuel and oil mix. The right wing fuel tank was breached, and no fuel was observed in the tank when viewed with an electronic borescope.

Four fuel containers were found in hangars used by the motorglider owner. Fuel samples were taken from all four fuel containers. Two of the fuel samples had the consistency of a fuel and oil mix, the other two fuel samples had the consistency of automotive fuel. A container of 2-stroke engine oil was found in one of the hangars.

## **3.0 Engine Examination**

The single cylinder, 2-stroke reciprocating engine had broken free from the airframe and displayed impact damage signatures. The propeller flange was impact separated from the propeller drive shaft. The cylinder head and cylinder sleeve were removed from the engine. There was a quarter sized hole in the middle of the piston and the piston material around the hole had been eroded. The cylinder sleeve displayed minor scoring of the cylinder walls and the cylinder head was undamaged. The intake and exhaust ports of the cylinder were unobstructed and displayed normal operating signatures. It was noted that one of the cylinder studs displayed deposits and corrosion consistent with an exhaust leak around the cylinder. The piston was removed from the connecting rod; the connecting rod and the piston pin bearing displayed normal operating and lubrication signatures. The crankcase displayed impact damage signatures and a portion of the forward crankcase was cracked and pushed aft. The crankshaft was rotated by hand and could rotate freely for about 330° of movement. The crankshaft was incapable of rotation when the connecting rod was near bottom dead center, which was consistent with the impact damage observed to the crankcase.

The propeller reduction gearbox was removed and disassembled. The internal components displayed normal operating and lubrication signatures. The coolant pump was disassembled and visually inspected. The coolant pump gears remained intact and fluid that was consistent with engine coolant was found inside the coolant pump housing.

The cylinder head, cylinder, and piston head were retained and sent to the National Transportation Safety Board Materials Laboratory for further examination.



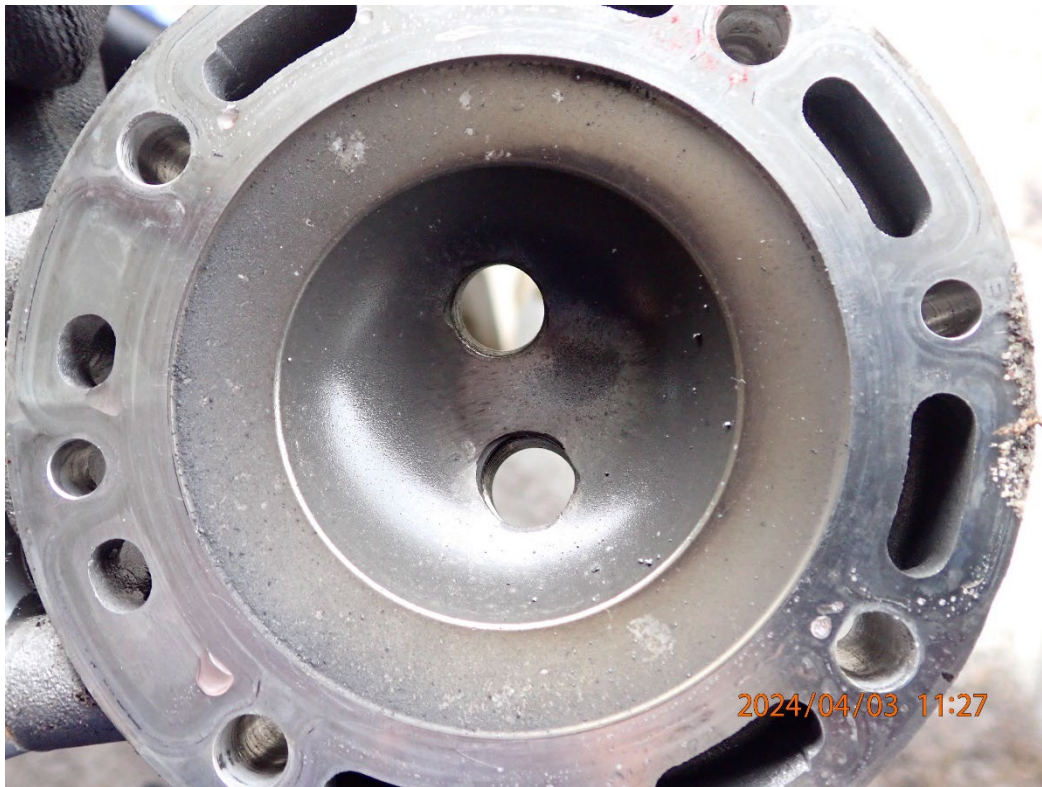
**Photo 20: Overview of the impact separated engine.**



**Photo 21: View of the impact separated propeller flange.**



**Photo 22: View of the overload fractured propeller driveshaft.**



**Photo 23: View of the cylinder head.**



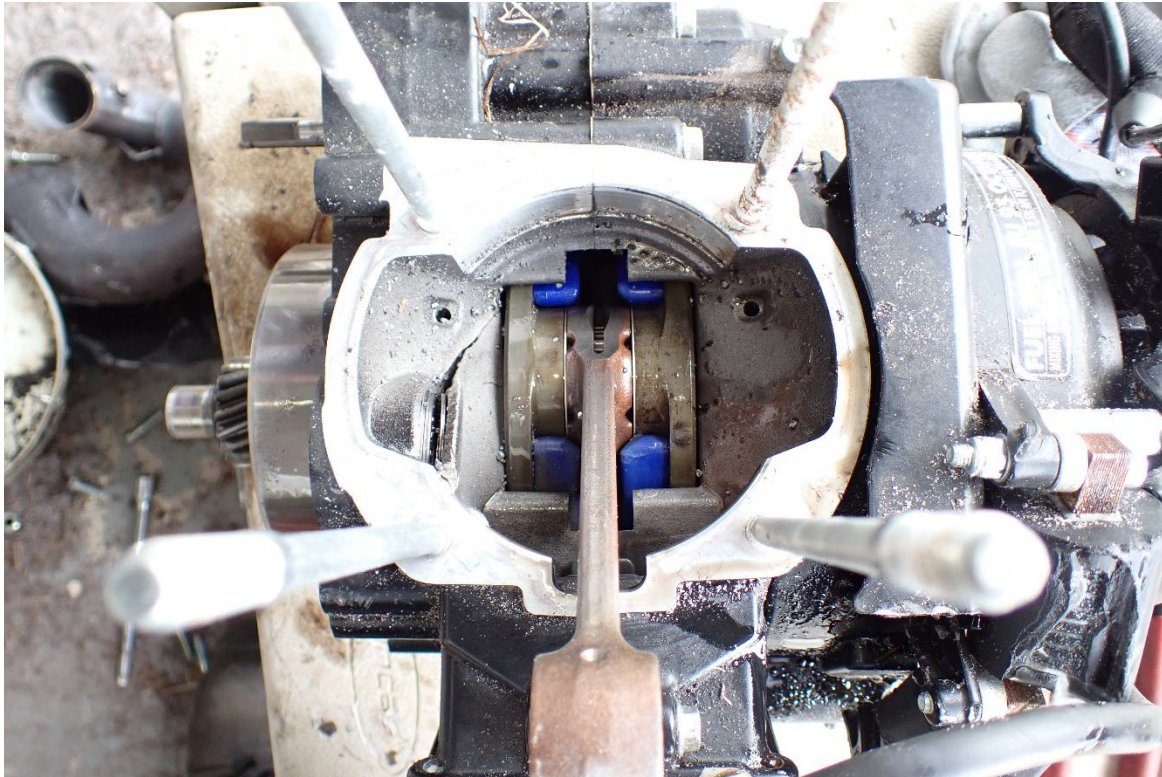
**Photo 24: View of the piston head.**



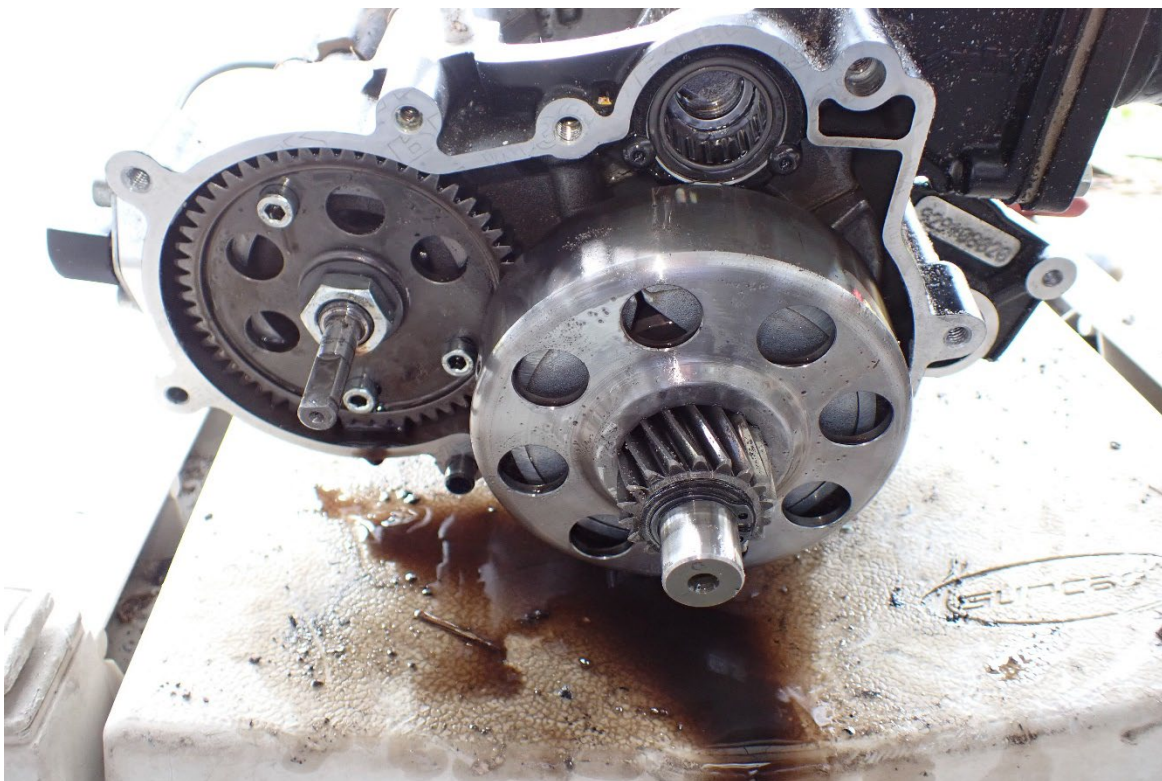
**Photo 25: View of the piston head.**



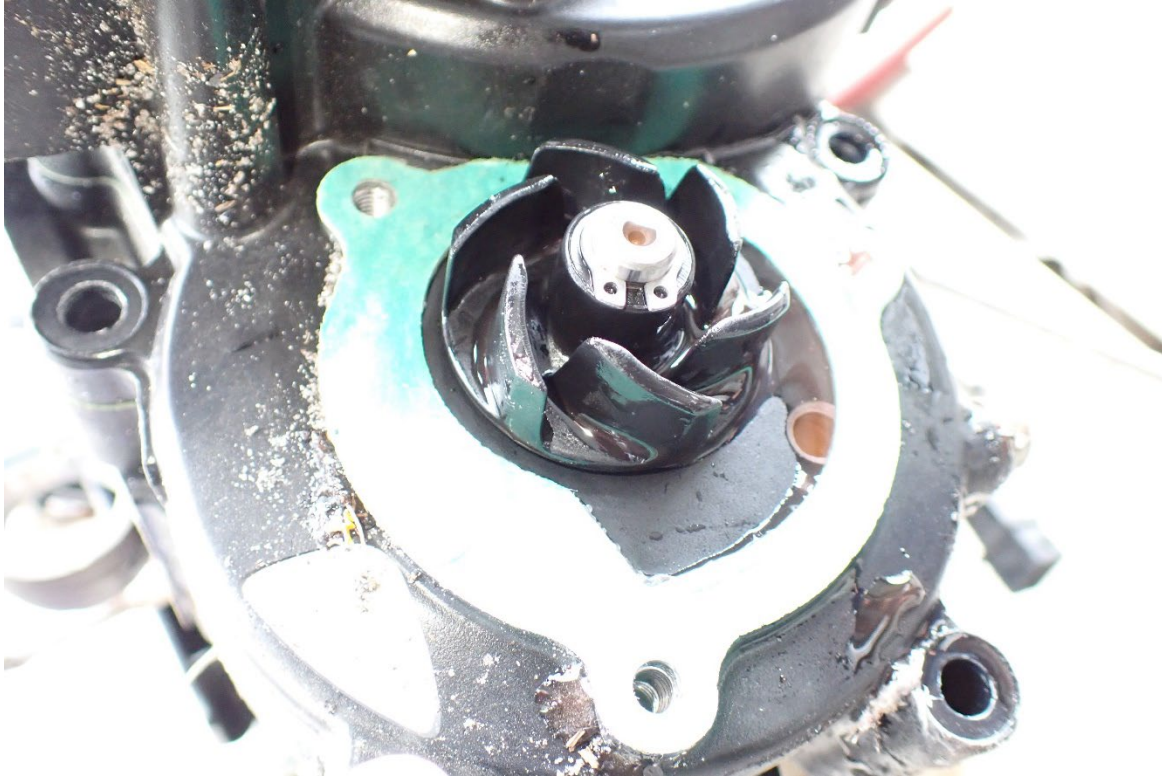
**Photo 26: View of the piston head.**



**Photo 27: View of the piston rod, crankshaft, and fractured crankcase.**



**Photo 28: View of the propeller reduction gear.**



**Photo 29: View of the disassembled coolant pump.**

### **3.1 Induction and Exhaust System**

The air intake and exhaust were impact separated from the engine and exhibited impact crushing.



**Photo 30: View of air intake filter.**

### **3.2 Magnetos**

A single inline magneto remained installed on the engine and was not tested.

### **3.3 Ignition System**

Both spark plugs remained secured to the cylinder and the ignition leads remained attached to both spark plugs; however, the ignition leads were impact separated from their respective coils. The spark plugs were arbitrarily labeled A and B for identification purposes. Both spark plugs displayed normal wear signatures and had material that was adhered to the spark plug electrodes that was consistent with eroded piston material. The engine was equipped with a dual ignition system controlled by two separate capacitor discharge ignition (CDI) systems. Neither CDI could be tested at the time of the examination.



Spark plug - A



Spark plug - B

**Photo 31: View of the electrodes of both spark plugs.**

### **3.4 Fuel System**

The inline fuel filter was removed and examined, and no debris was found in the filter pleats. The engine driven vacuum fuel pump was removed and disassembled. Both rubber diaphragms were undamaged and pliable with no debris noted. The carburetor was separated from the engine which was consistent with the observed impact damage. The cockpit throttle control was actuated, and the carburetor throttle valve was noted to operate normally. The carburetor was disassembled, and the internal components were visually inspected. All of the components displayed normal operating signatures and there were no obstructions noted in the carburetor tubes and jets.



**Photo 32: View of the inline fuel filter.**



**Photo 33: View of the disassembled fuel pump.**



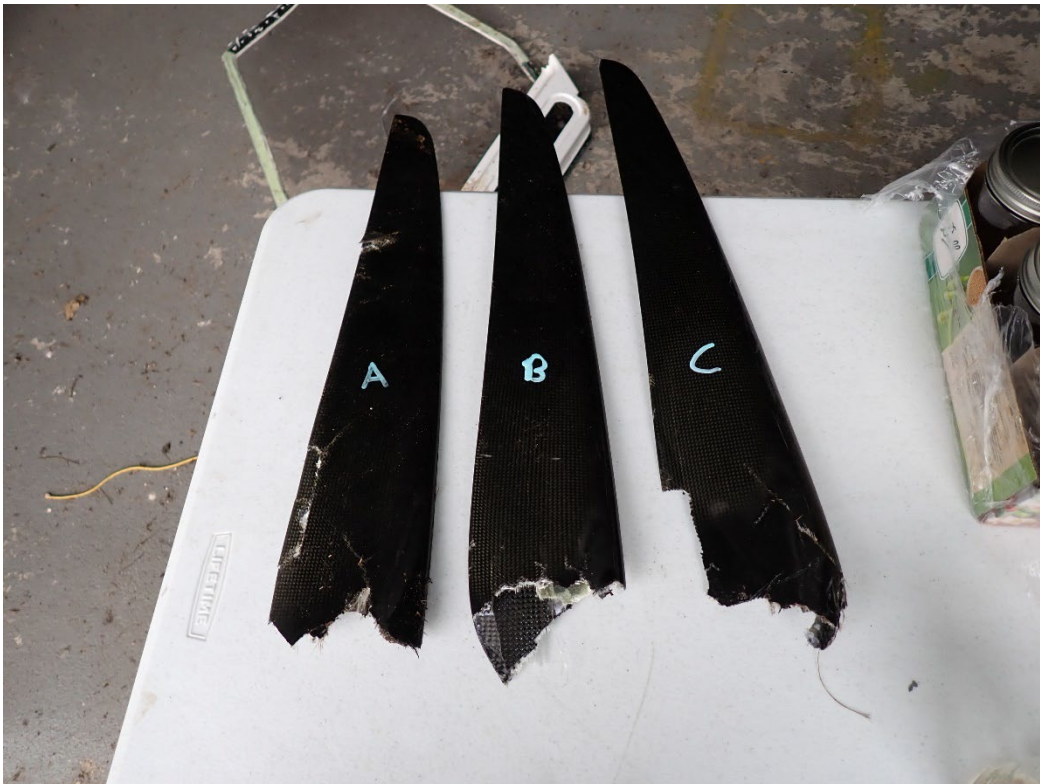
**Photo 34: View of the carburetor as found.**



**Photo 35: View of the disassembled carburetor pieces.**

#### 4.0 Propeller Examination

The three blade, fixed pitch propeller remained attached to the propeller flange; however, the propeller flange was fracture separated from the propeller drive shaft. All three of the propeller blades were separated from the propeller hub and were arbitrarily labeled A, B, and C for identification. There was no significant chordwise scratching or leading edge gouging noted in the propeller blades.



**Photo 36: View of the 3 impact separated propeller blades.**

Submitted by:

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