NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

July 29, 2021

AIRFRAME EXAMINATION

WPR20LA315

This document contains 13 embedded photos.

A. ACCIDENT

Location:	Emmett, Idaho
Date:	September 22, 2020
Aircraft:	Air Tractor, AT-802A, N836MM
NTSB Investigator-in-Charge:	Eric M. Gutierrez

B. PARTICIPANTS

Eric M. Gutierrez
Air Safety Investigator
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Dakota Lowe
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Air Tractor, Inc.
Olney, Texas

Victor Trotter
President/CTO
Trotter Controls, Inc.
Fort Worth, Texas

C. SUMMARY

Examination of the recovered airframe and fire gate system revealed no anomalies that would have precluded from normal operation.

D. DETAILS OF THE INVESTIGATION

1.0 Aircraft Examination

Examination of the recovered wreckage revealed that the cockpit, fuselage structure were mostly intact, the left wing was bent aft at the wing root, the vertical and horizontal stabilizer and the right wing was separated by wreckage recovery personnel to facilitate wreckage recovery.

The fuselage was mostly intact. The engine, cowling, and forward portion of the fuselage was impact damaged. The forward section of the cockpit was impact damaged and was displaced to the right. The left side of the fuselage, forward of the cockpit was impact damaged, with multiple separations found in the tubular fuselage structure. The left side of the fuselage, aft of the cockpit was impact damaged, bent, and twisted throughout. The right side of the fuselage, forward of the cockpit was impact damaged, with multiple separations found in the tubular fuselage structure.

Figure 1: View of left side of airplane.

The instrument panel was impact damaged with multiple instruments displaced.

Airspeed: 0
Altimeter: 3,800, Kollsman: 30.02
VSI: +300 climb
The following circuit breakers found to be “out”

- Control Nose LTE
- Main RH
- Dome Light
- Flaps
- Fuel Boost Pump

Condition lever: full forward (flight idle)
Propeller Controller: Feathered
Power Lever: Forward

The fuel selector was in the “Main” fuel tank position.

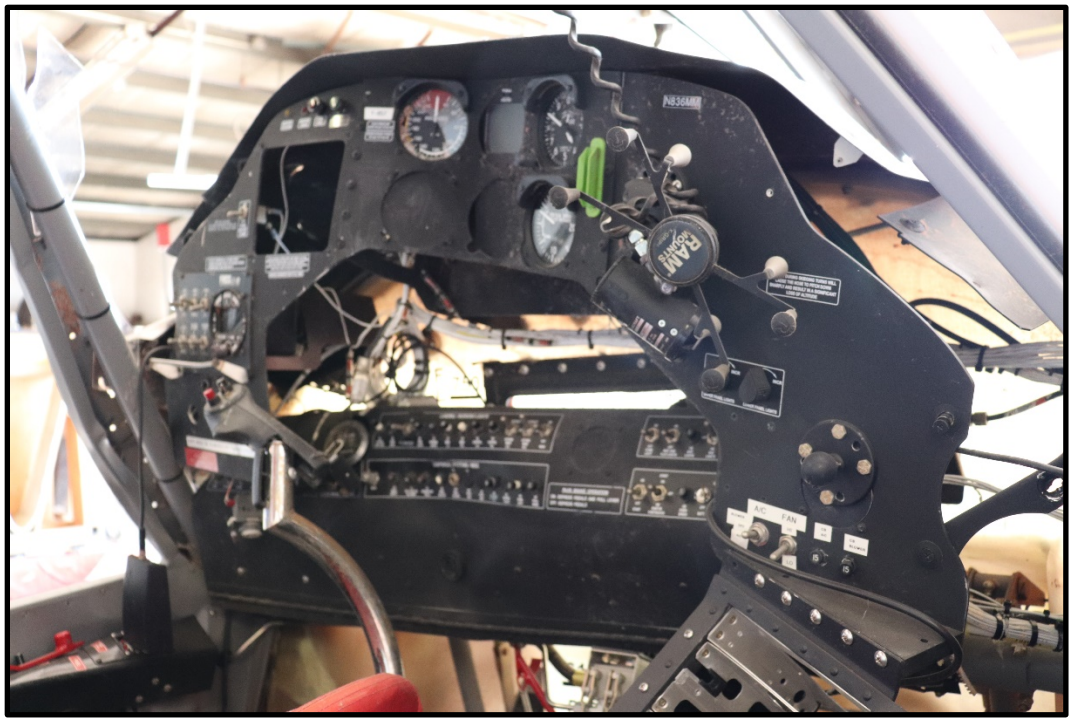

Figure 2: View of instrument panel.

The engine remained attached to the engine mount. The propeller gearbox and propeller were separated.

Four of the five propeller blades remained attached to the propeller hub. One propeller blade exhibited bending aft about mid span, with polishing and unidirectional striations on the cambered side of the blade. A propeller blade exhibited bending forward about mid span, with polishing and unidirectional striations on the cambered side of the blade. A propeller blade exhibited bending aft near the hub, with polishing and unidirectional striations on the cambered side of the blade. A propeller blade exhibited bending aft about mid span, with polishing and unidirectional striations on the cambered side of the blade. The separated propeller blade exhibited bending aft about mid span, with polishing and unidirectional striations on the cambered side of the blade.

Figure 3: View of Propeller.

The left wing remained attached to the fuselage and was bent aft about 90°. The leading edge of the wing exhibited aft crushing throughout its span. The upper and lower wing was torn from mid span to wing tip. The outboard portion of the left flap was separated from the wing. The outboard portion was crushed between the wing and the fuselage. The aileron separated from the attachment points and exhibited crushing and bending throughout.

Figure 4: View of left wing damage.

The right wing was separated by recovery personal at the wing root. About 6 ft of the outboard portion of the right wing exhibited impact damage was removed to facilitate recovery. The right flap was separated from the attachment points and exhibited crushing and bending throughout. About 5ft of inboard section of aileron remained attached to the wing, the remaining outboard portion of the aileron was separated and exhibited crushing and bending throughout.

Figure 5: View of ring wing damage.

The left horizontal stabilizer was separated at the root. The leading edge exhibited crushing throughout its span, the middle portion of it was torn open, and either not located, or displaced. The left auxiliary vertical fin leading edge exhibited aft crushing. The v strut remained attached to the horizontal stabilizer via their mounts. The v strut fuselage attachment point was cut by recovery personal. The left elevator was separated from the horizontal stabilizer and was separated about mid span.

Figure 6: View of left horizontal stabilizer.

The right horizontal stabilizer was separated at the root. The v strut remained attached to the horizontal stabilizer via their mounts and bending about 2 ft from the fuselage attachment point. The leading edge exhibited upward crushing of the skin near the root, with 45° buckling. Downward crushing of the leading edge about 18 inches from the tip of the horizontal. The right elevator remained attached to the horizontal stabilizer via their mounts.

Figure 7: View of right horizontal stabilizer.

The vertical stabilizer and rudder were separated by recovery personal. The vertical stabilizer was slightly left about mid height. The rudder was buckled throughout from about mid height to the top of the rudder. Punctures of the skin on the left side of the rudder were observed about 15 inches from the bottom of the rudder.

Figure 8: View of vertical stabilizer and rudder.

Flight control continuity was established from all primary flight control surfaces to the cockpit controls. Separations in the control tubes were observed consistent with impact damage and recovery operations.

2.0 Fire Retardant Dispersal System

Fire Retardant Dispersal Manufacturer: Trotter Controls, Inc.
Fire Retardant Dispersal Model Number: FRDS GEN III

The fire retardant dispersal system was separated from the fuselage with significant impact damage. The forward fire gate bulkhead separated from the fuselage. The fire gate gearbox remained attached to the forward fire gate bulkhead. The gearbox was tested using a hand tool and the gearbox rotated from stop to stop. The electric motor was separated from the gear box and was impact damaged. The fire gate torque tube was separated from the gearbox and exhibited upward bending about mid span. Four of the six door pull arms remained attached to the torque tube but were separated from the doors. One of the door pull arms was separated, heavily damaged and the remaining pull arm was not recovered. The aft fire gate bulkhead separated from the fuselage. The emergency dump linkage was heavily damaged but remained attached to the aft fire gate bulkhead.

Figure 9: View of fire retardant dispersal system.

Mechanical continuity of emergency dump handle was established from the cockpit to the gate, with two fractures in the linkage tubes consistent with impact damage. The linkage position at the fire gate was consistent with the fire gate in the closed position.

Figure 10: View of aft fire gate bulkhead.

Electrical continuity from the battery buss and main breaker was established to the motor drive. The motor drive was heavily damaged as was the electric motor. Electrical continuity from the motor contactor and EDUMP limit switches was established. The limit switches were tested to work properly.

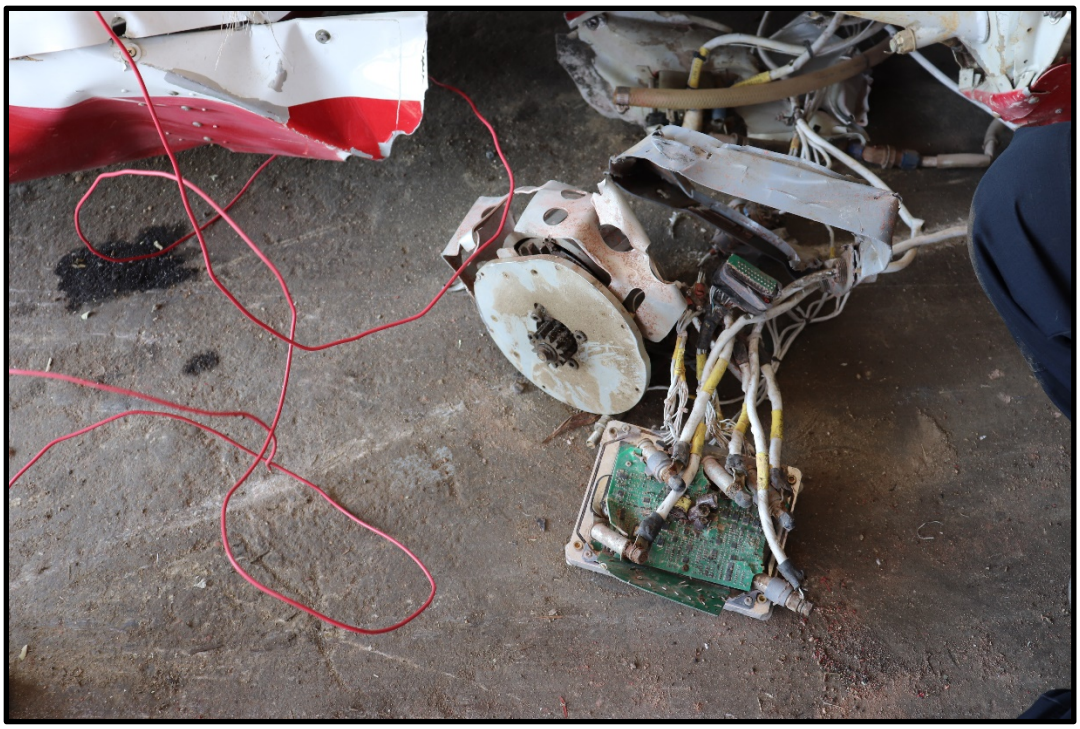

Figure 11: View of electric motor damage.

Electrical continuity was established from the +28V buss to the manual salvo button to the electric motor cover bulkhead. The manual salvo button was separated and not recovered. The salvo housing was separated from the instrument panel.

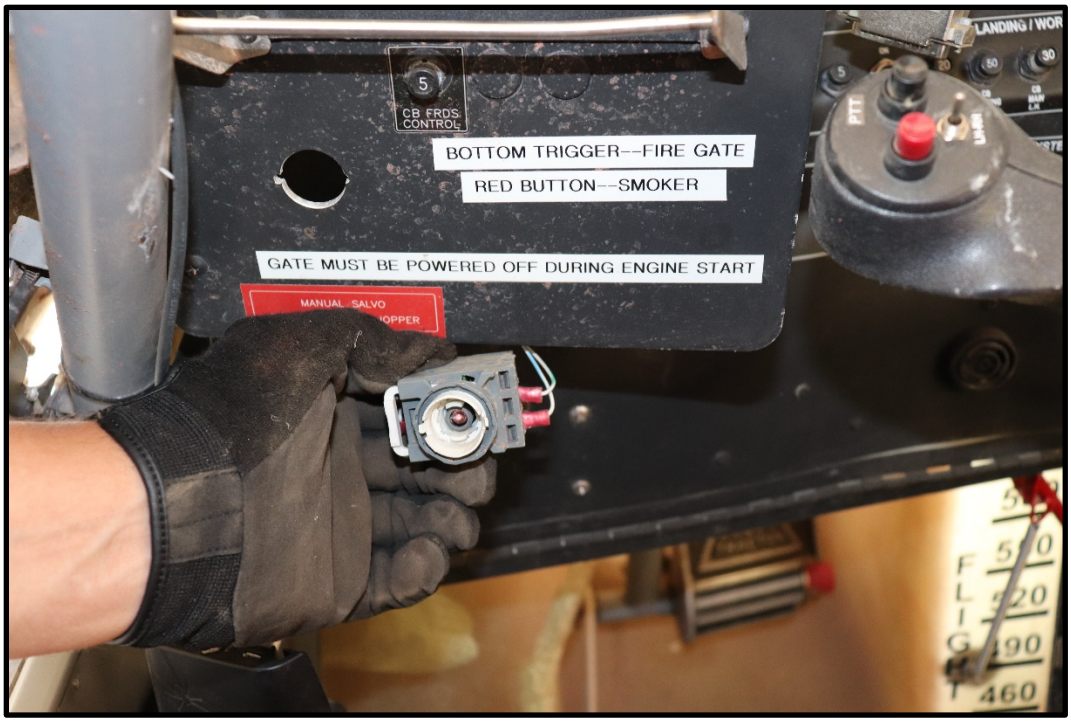

Figure 12: View of manual salvo button.

The drop switch wiring had been modified from the factory configuration to move the position of the switch from the top of the flight control stick to the lower "trigger" position. The trigger switch utilized was a single pole switch, a 24Vdc relay had been wired in to create the second (normal closed) contact needed to operate the system. The wires used for the relay were MS-22759 or similar with push on type terminals that remained intact and installed on an automotive grade +24V, single pole relay. Labels were not applied to the wiring.

The switch would only affect the AUTO/MANUAL modes of operation and would have no effect on the MANUAL SALVO operation.

The manufacturer wiring configuration utilizes a 2 channel NO/NC, that prevents short circuits from causing an inadvertent dump.

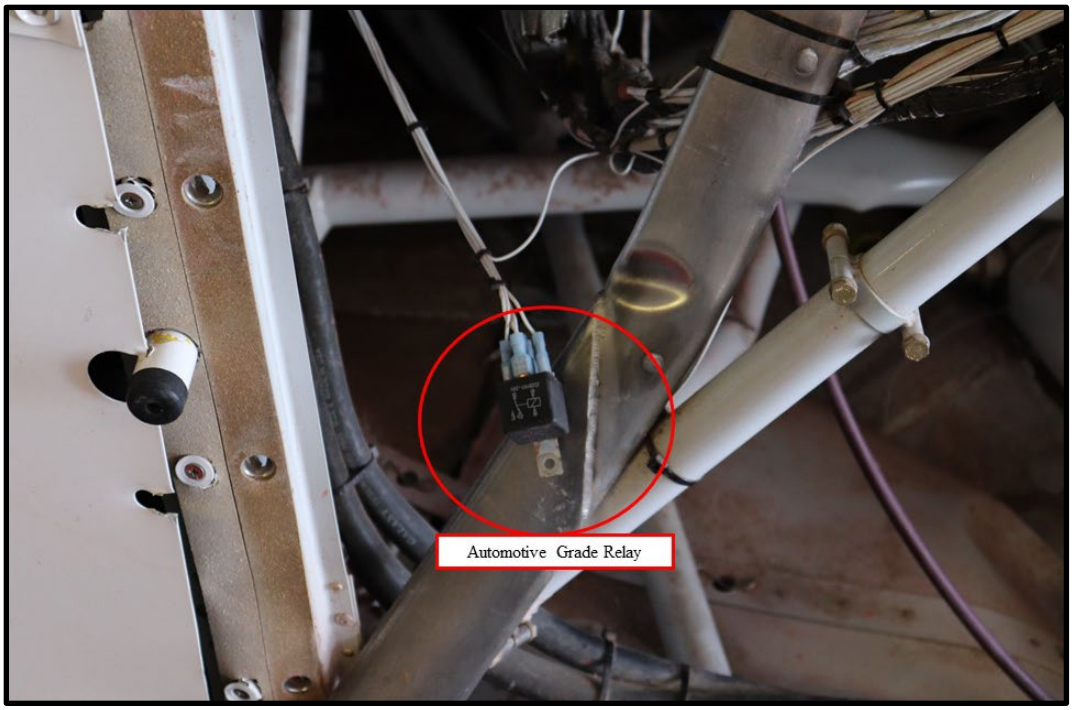

Figure 13: View of automotive grade relay.

Submitted by: Eric M. Gutierrez